ERIC Document Resume	See Instruction Sheet	DATE OF RESUME 6/11/65	DATE RECEIVED

A. PUBLICATION DATA

1. ERIC NUMBER	2. ORIGINATOR CONTROL NO(S).	3. IDENTIFICATION NO.	DO NOT WRITE IN SPACE BELOW
ED000757	8201		

4. AUTHOR(S):
Meaney, John W.

5. TITLE OF DOCUMENT ABSTRACTED:
Televised College Courses: A Report About the College Faculty Released-Time Program for Television Instruction

6. PUBLICATION TITLE:
N.A.

MICROFILM COPY AVAILABLE YES [X] NO [ ]

COPYRIGHT GRANTED YES [ ] NO [X]

COPYRIGHT RELEASE FILED YES [ ] NO [ ]

TYPE OF REPORT
PROPOSAL [ ]
IN-PROGRESS [ ]
FINAL [■]
FOLLOW-UP [ ]

7. EDITOR(S):
N.A.

8. PLACE OF ORIGIN
ORG. Fund for the Advancement of Edu
ST. 477 Madison Ave.
CITY. New York 22, NY
TELE. EXT.
INST/LOC CODE

9. PUBLISHER OR SOURCE
Fund for the Advancement of Education

10. VOL.	11. PAGES	12. MO./YR.	13. TOTAL PP.
N.A.	N.A.	Oct. 62	88

OTHER ERIC REFERENCES:

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR
report

16. INDEXING TERMS (6-12)

teaching methods	administration	opinions	teaching aids	
teachers	achievement	finances		
educational TV	students	audio-visual aids		

17. ABSTRACT (MAX. 250 WORDS)

The report concerns the results of an experiment supported by the Fund for the Advancement of Education to give college faculty members of the 27 participating colleges and universities an opportunity to spend full time in teaching a course by television. A further purpose was to give the institutions an opportunity to build television into their regular curriculum.

The report is based on field interviews by the author with administrators and faculty members of participating institutions, studies of student achievement and student reaction to the telecourses, published and unpublished materials, and intensive discussions between administrators and professors from the participating institutions during a 2-day conference in February 1962.

The report also contains a supplementary report on the teaching of economics by television by Donald W. Paden of the University of Illinois. An analysis of the factors that enter into cost calculations is included.

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

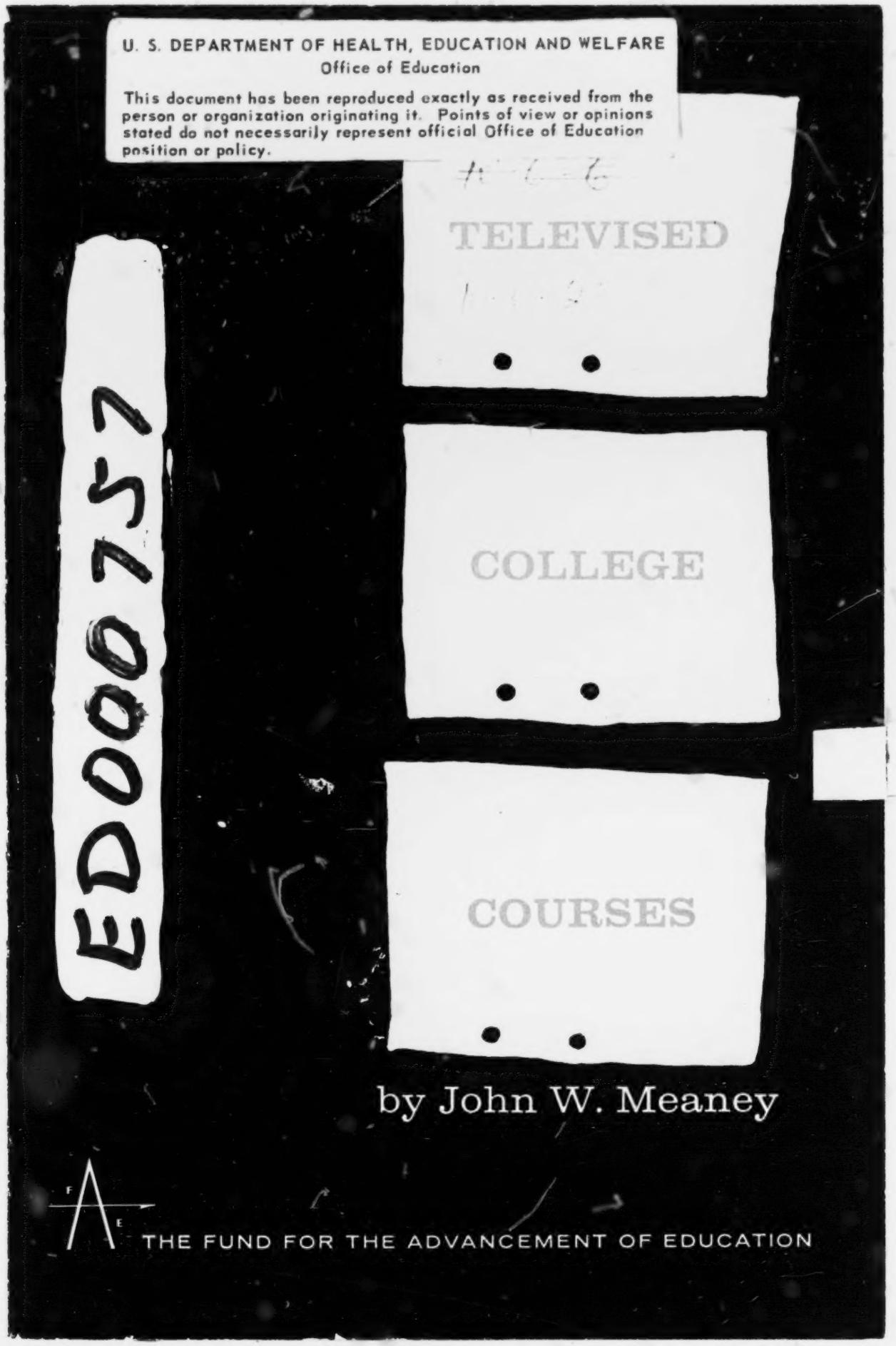
19. SUPPORTING ORGANIZATION	20. DIVISION OR DEPT.	21. CONTRACT NO. / PROJECT NO.
	22. TOTAL COST OF PROJECT	
	23. DURATION OF PROJECT	U.S. Department of Health, Education, and Welfare Office of Education

ERIC Form 1

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education

This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

ED000 757



8201

Library of Congress Catalog Card Number 62-21858
Additional copies of this Report are available from the offices of
The Fund for the Advancement of Education
477 Madison Avenue, New York 22, N.Y.

R-6-23

TELEVISED COLLEGE COURSES

by JOHN W. MEANEY

A Report about the College Faculty Released-Time Program
for Television Instruction
(with a Supplementary Report
"The Teaching of Economics via Television at the
College Level" by Donald W. Paden)

OFFICERS

CLARENCE H. FAUST
President

ALVIN C. EURICH
Vice President

ELIZABETH PASCHAL
Secretary

LESTER W. NELSON
Treasurer

EXECUTIVE STAFF

JAMES W. ARMSEY
Associate Program Director

EDWARD J. MEADE, JR.
Program Assistant

G. H. GRIFFITHS
Associate Program Director

JOHN J. SCANLON
Program Associate

ARNOLD J. KUESEL
Assistant Treasurer

SIDNEY G. TICKTON
Program Associate

The Fund for the Advancement of Education is a philanthropic organization established in 1951 by the Ford Foundation to work in the field of formal education.

Its chief activity has been the support of experimental programs which hold promise of advancing education in American schools and colleges. To date the Fund has been granted approximately $61,000,000 by the Ford Foundation.

October, 1962

Board of Directors

ROY E. LARSEN, *Chairman*
Chairman, Executive Committee,
Time, Inc.

CLARENCE H. FAUST
President, The Fund for the
Advancement of Education

FRANK W. ABRAMS
Former Chairman of the Board,
Standard Oil Company of New Jersey

WALTER S. GIFFORD
Honorary Chairman, American Telephone
& Telegraph Company

FREDERICK B. ADAMS, JR.
Director, The Pierpont Morgan Library

MAURICE HECKSCHER
Attorney, Duane, Morris and Heckscher

RALPH J. BUNCHE
Under Secretary for Special Political
Affairs, The United Nations

MRS. DOUGLAS HORTON
Former President, Wellesley College,
Former Director of the WAVES

CHARLES D. DICKEY
Chairman, Committee on Trust Matters,
Morgan Guaranty Trust Company

ARTHUR A. HOUGHTON, JR.
President, Steuben Glass, Inc.

JAMES H. DOUGLAS, JR.
Lawyer, Gardner, Carton, Douglas,
Roemer and Chilgren

WALTER LIPPMANN
Author and Journalist

ALVIN C. EURICH
Vice President, The Fund for the
Advancement of Education

RALPH E. MCGILL
Publisher, The Atlanta Constitution

THE FUND FOR THE ADVANCEMENT OF EDUCATION

TABLE OF CONTENTS

Preface 5

Foreword 7

The Telecourse 9

Various Approaches 14

Advantages and Disadvantages 21

Future Possibilities 35

Appendix 47

I—Location of Educational Television Stations on the Air as of September, 1962 47

II—Grants Made Under the Released Time Program 48

III—List of Telecourses Taught in the Released Time Program, in Order of Size of Enrollment 50

IV—Inventory of Recorded Courses Produced under Released Time Grants 52

V—Quotations from Telecourse Professors 54

Supplement: "The Teaching of Economics via Television at the College Level" by Donald W. Paden 65

PREFACE

TELEVISION EMERGED as a powerful instrument of communication a decade ago at about the time the Fund for the Advancement of Education came into being and its parent organization, The Ford Foundation, began its expanded program. In seeking new and more effective ways to provide better education, both organizations took an early interest in exploring the possibilities of the new technology. The Fund and the Foundation have had two objectives in contributing to the development of educational television: (1) to provide a general informational and cultural television service not otherwise available, and (2) to improve and extend the quality of teaching. In the first objective, the Fund for Adult Education played a pioneering role. Together these three organizations have provided some $75 million in support of educational television development.

Slightly more than half has been used to support the activation and development of educational television stations, regional ETV networks, and the National Educational Television and Radio Center. There are now 72 educational television stations across the country, most of which are affiliated with the Center, and some of which also participate in regional networking arrangements. Full schedules of daytime and evening programs in the arts, sciences, and humanities, and in public and international affairs have been produced or broadcast by these stations.

Nearly half the total support has been devoted to television for formal instruction in schools and colleges. The Fund for the Advancement of Education early became interested in television as a means of extending the reach of the superior teacher to greater numbers of students. The Fund's attack on the problem of improving the utilization of teachers included a series of small-scale experiments in televised instruction in schools and colleges. As the potentials of the new medium became evident and large-scale support appeared desirable, the Ford Foundation contributed larger resources toward continuing support of significant experiments. Among the projects initiated by the Fund which later received Foundation support were the National Program in the Use of Television for the Public Schools, the Hagerstown Closed Circuit Experiment, and the Continental Classroom credit courses broadcast on a nationwide commercial network. Instructional television then became a joint endeavor of both organizations, and in 1959, a joint report of the activities both had supported in this field was issued under the title *Teaching by Television* (revised in 1960).

Although the greatest use of television for direct teaching has occurred in the schools, some colleges and universities have also used television to help solve their quantitative and qualitative educational problems. Others plan to do so as the enrollment increases move from the lower schools into the colleges and universities. The programs described in this report were designed to give college faculty members an opportunity to spend full time in teaching a course by television and to give institutions an opportunity to build television into their regular structure and curriculum.

As part of its objective of disseminating information on significant educational experimentation, the Fund commissioned a report on the experiences of the 27 colleges and universities in this Faculty Released Time Program. Dr. John W. Meaney, one of the early pioneers in educational television, was asked to make a survey among these colleges and to write a report of his findings. Dr. Meaney was associated with KUHT-TV, University of Houston, the first educational television station in the U.S., from its founding in 1953 until 1960, the last two years as manager. He organized the station's film production facilities and produced and directed several series of programs for distribution by the National Educational Television and Radio Center. In 1957-58, on leave of absence in Europe as Fulbright Research Scholar, he produced a series of filmed interviews with the noted psychiatrists C. G. Jung and Ernest Jones. From March 1960 to June 1961 he served on the staff of the Educational Media Branch of the U.S. Office of Education. Dr. Meaney has a Ph.D. degree in English from the University of Texas. He is now Assistant to the Chancellor, University of Texas.

It is the Fund's hope that this report will give institutions that want to explore TV teaching on their own some insight into its problems and possibilities. Requests for more detailed information should be directed to the institutions listed in Appendix II.

CLARENCE H. FAUST

FOREWORD

THE OFFERING of televised courses for college credit was one of the first instructional uses of television. It dates from the early 1950's when institutions such as Western Reserve University, Iowa State University, and the University of Houston took the first experimental steps toward using the new medium for teaching. It has been developing over the past ten years, in both broadcast and closed circuit operation, in public and private colleges and universities, in engineering schools, teacher-training institutions, junior colleges, and technical institutes. No accurate data are available on the number of institutions of higher education that systematically use television for formal instruction, but it is known that almost every subject in the college curriculum has been taught somewhere with television.

This is a report of a series of Ford Foundation grants made in the period 1958 to 1961 to strengthen college-level credit course offerings on television. The series developed from an earlier program, begun in 1955, in which faculty members were released from part of their regular teaching duties in order to present programs on the newly established educational television stations. These were informal or formal courses, credit or non-credit, according to the interests of the particular institution, but were frequently general cultural programs which attracted wide community audiences outside the residential student body. Grants under this phase of the program were in the amount of $37,500 per institution, on a three-year basis, and involved institutional commitment of $22,500 in matching funds.

By the end of October 1958, at least half of the 34 educational stations then on the air were operated by educational agencies which had meanwhile begun to assume responsibility for broadcasting formal instruction as well as cultural programs. As the concept of educational television expanded to include direct teaching, the Foundation shifted the emphasis in its released time grants from general cultural programming to instructional television. Under this phase of the Faculty Released Time Program, grants were made for the payment of salaries to teachers who were released to spend full time presenting credit courses to regularly enrolled students. Most of the grants were on a three-year declining support basis, with the Foundation underwriting the entire salary during the first year. In the second year, the Foundation's support was normally limited to two-thirds of the professor's salary, and in the third year, to one-third the salary. Thus the institution was expected to continue the

professor's full-time commitment to the television offering and to commit itself to assume an increasingly larger share of the teaching costs. At the termination of the second phase of the program in April 1961, about $1,200,000 in Foundation funds had been granted to the 27 institutions listed in Appendix II.)

This report is based primarily on field interviews which the author had with administrators and faculty members of all of the colleges and universities participating in the program, on various studies of student results and reactions to the telecourses, on miscellaneous published and unpublished materials, and on two days of intensive discussions at a conference held in Austin, Texas, in February, 1962, where administrators and professors from the various institutions came together to exchange experiences. Chapter III on "Advantages and Disadvantages" has also been circulated in rough draft to authorities representative of Continental Classroom, Pennsylvania State University, the Chicago City Junior College, and Midwest Program on Airborne Television Instruction in order that any important differences or confirmations from these separate programs might be noted. Generous cooperation by these authorities is hereby gratefully acknowledged, and the author hopes, in consequence, that this report will reflect a substantial consensus of experience to date on the use of television for instruction at the college level, with the exception of such specialized uses as those of the armed forces, medical, and dental schools. However, responsibility for the other chapters, particularly the final, crystal ball chapter on "Future Possibilities" must rest entirely with the author.

JOHN W. MEANEY
University of Texas
Austin
September 30, 1962

THE TELECOURSE

THERE WAS NOT a student in sight, only a glare of lights ending in the silhouettes of camera pedestals backing and filling around the studio. Like lecturing into the dawn, thought Professor Brown. Yet, lecturing wasn't the right word, either, though it was hard to find a substitute. He remembered that he must use a conversational tone in order to match the intimacy of his eye-to-eye contact with the students who were watching and listening in the other buildings. He was about to have his presence recorded electronically in a kind of time-skip that would also make him available to another group of students that afternoon, without any further effort on his part.

"Stand by," said a young man in silhouette between the cameras. Professor Brown could faintly see one of the man's arms pointing upward. An apocalyptic sight, or maybe Martian—earphones and a wire reaching around in front of the mouth to hold a small, black microphone shaped like an acorn. Suddenly the arm pointed forward to the man at the lectern.

"In our last meeting," Professor Brown heard himself saying, "we examined the medieval world reflected in the writings of the poet Dante. Today we will make a transition from the Middle Ages to the Renaissance, and we will do this by considering the contrasts between two strong and typical personalities, Savonarola and Michelangelo. You have seen repeatedly in past lectures that it is impossible to specify any single year as marking firmly the boundary between two epochs of history. Here again, it is interesting to note that these two men, Savonarola so representative of many features of the Middle Ages, and

Michelangelo so surely a new man of the Renaissance, actually lived at the same time in Florence, Italy, during the latter years of the fifteenth century."

"Girolamo Savonarola was a monk, prior of the monastery of San Marco in Florence. . . ." The famous black-hooded picture of the man appeared, as scheduled, on the studio television set at the edge of the glare to his right, and Professor Brown glanced o[illegible]ly to confirm this before going on. He hoped that the line drawing o[illegible]ichel-angelo would come through as well. These and many other pictures were in the set of 35 mm. slides that he had brought several days ago to the television director of his course, a graduate student in the Radio and Television Department. Bright kid, with a real interest in literature. Professor Brown had almost talked him into majoring in English, but his parents had persuaded him that the other major would qualify him more directly for a job after graduation. Something of an anomaly, this Radio and Television Department—operating a television studio for teaching by other departments, yet orienting its own courses so as to prepare its students for commercial television where the "market" is. Pity that a man with a deep interest in Shakespeare must do his master's thesis as a questionnaire to determine the number of people employed in commercial television news departments!

The director in the control room behind the double plate-glass windows was watching and listening to the Professor under the lights in the studio. At every key word, "Savonarola," "Michelangelo," "Fra Angelico," "Sistine Chapel . . ." the director punched a button on his panel, switching the output of the television system from the studio to the slide machine. After he had punched back to the studio he pointed with his left hand toward the machine operator as a signal to move the next slide into place.

". . . To confirm this shift of feeling, let us look at another art form, sculpture. You recall the strikingly austere figure of the Prophet Melchizedek in the north porch of the Cathedral of Chartres." (The slide was on.) "His elongated body, half pillar, half symbol, suggests the spiritual orientation of the medieval period, subordinating the human body to the life of the spirit. Now see the contrast in Michelangelo's statue of David." (The new slide appeared.) "Here is the human body glorified, and the implications are not only spiritual but political, as well, particularly in the Florentine State of the fifteenth century . . ." We've had such things as slides for a long time, reflected Professor Brown, and yet, television seems to concentrate and mount the other media in a handy synthesis. Maybe it is the broad audience base that

seems to make worthwhile the extra effort of visualization. Over five hundred students would see his lecture that week in the four classrooms wired into the system. If he could persuade the departmental chairman to budget five thousand dollars for videotape next semester—so that he could save the lectures not just for the afternoon but for the following semester and even for another year or two—then he would be reaching several thousand students. He could pull out a few lectures from the set every semester so as to polish and re-record them until the entire group became as perfect as he could possibly make them. He dreamed of the added time that he would be able to spend searching out just the right visuals. There would even be time to spend on correspondence, seeking copyright release to use current art work in his television presentations. He worried sometimes now about taking pictures from books, but the director assured him that no one had ever sued an educational institution on such matters. He recalled with regret the refusal he had received from the commercial network when he had asked for permission to use a section of their magnificent production of a few years ago on the burning of the vanities in Savonarola's Florence. Union contract restrictions, they said.

Professor Brown was an amateur photographer, and he had a slide-making stand rigged up at home. There until late at night he would snap slide copies of pictures in library books. It was probably his interest in visualization that first prompted him to volunteer for the humanities telecourse. Many in the department thought him odd for doing it. He was a full professor in one of the better departments at State; he had tenure. He could have gone on in the same respected posture for the rest of his life. Yet there was a restlessness about him—he liked to think that it was a mental alertness. Sometimes he was tempted to hang in his office a sign saying, "Security is not enough." It would be aimed at the younger faculty members as well as the students. His restless mind was a thorn to the administration, too, in his agitations and moves at the AAUP chapter meetings. This television exploration, compounding the auditory message of the lecture with all the impact of the visual arts and the realia of the ages, brought forth in him a secret chuckle of satisfaction now and again as he wondered if this was what it was like to be a Renaissance Man. With all the hard work and extra hours that the course on television exacted from him, he enjoyed the satisfaction of having done it, enjoyed it in spite of the Martian environment of the studio and in spite of the loss of personal pleasure at seeing immediately after his words the light of understanding in the eyes of his students. He enjoyed it because he knew within himself that the students were

getting better lectures this way. He had never, in all his years of teaching, organized a course as well as this one, never made it flow so efficiently from point to point and with such impact of visual illustration.

As he approached the end of his presentation he began to summarize and to sharpen the contrasts between the two personalities. He loved to end on a question, to leave the students wondering. Some of them did not like that, but they were not the better ones. He had done it in the earlier lecture on Greece, with the writings of the philosopher Plato deriding the democracy of Athens.

"Which was right, Savonarola or Michelangelo? Might it be that both were right, each on his own level of reality and meaning? . . ."

As he gathered up his notes he listened for the studio loudspeaker to bring him the sound of the madrigal theme music which would indicate that the director had switched the picture away from the studio and onto the slide of the unicorn tapestry over which the television system was superimposing the closing credits and acknowledgments, packaging up the lecture in the way that television people seemed to love so dearly.

He went to the faculty club for coffee, and after a few minutes the director joined him. Professor Brown felt that his lecture for Wednesday on the Reformation was in good shape, but the Friday presentation still needed much work.

"I'll have some slides of the Gesu in Rome to illustrate my points on the Baroque Age, and I think I know where I can borrow a few carved wooden cherubs from Bavaria. There is also a European film about an altar in Poland, but the fee for using it is pretty high. How much can we squeeze out of the budget this time? . . ." The lure of television for teaching, and the frustration so often encountered! The vast potential and the daily compromises! It wasn't only budget. It was so many things that could go wrong—human failures, electronic failures. But whenever he tried one of the old classroom-type lectures now he found himself even more frustrated by the many limitations there which he hadn't noticed before. The old way seemed almost medieval now.

Professor Brown does not exist, really, but his situation is more or less typical of that in which hundreds of college professors find themselves today as they pioneer in the exploration of college instruction by television. The account of Professor Brown's morning is meant only to give a suggestion of what the concrete reality of the telecourse is like today on dozens of college campuses.

How effective is this instruction? To assess the balance between the advantages and the disadvantages in college instruction by television at this time is a highly complicated and difficult undertaking. First, how

can anyone adequately define or describe something capable of such infinite variety? In one place, using one set of techniques, it is very different from what it is in other places. Moreover, everywhere colleges continue to experiment and to change approaches as they explore new techniques. The technological developments and refinements in television and related fields continue at an ever increasing rate. Changes in mass production of equipment and supplies bring alterations in the costs and the economic basis of the television teaching operation. Any assessment of what television instruction adds up to now must certainly be accompanied by an understanding that this is not necessarily (indeed, probably not) what it will be tomorrow nor what it can be next year.

Perhaps it would be possible to arrive at something of an assessment by describing, first, what it is that people are doing with television in the colleges, and then what they feel to be the advantages and disadvantages of the medium.

VARIOUS APPROACHES

COURSES TAUGHT under the Released Time Program were not regarded as experimental by the Foundation. By 1958 there had been reported hundreds of carefully controlled experiments testing the effectiveness of television as an instructional device in practically every area of instruction. These had resulted almost universally in the finding of "no statistically significant difference." In 1958, also, the National Defense Education Act in its Title VII provided funds for research grants in television and the other new media. Therefore, the Released Time Program after October, 1958, was intended to be an aid to institutions desiring to get on with the task of using television as an integral part of the instructional process in high-quality formal courses.

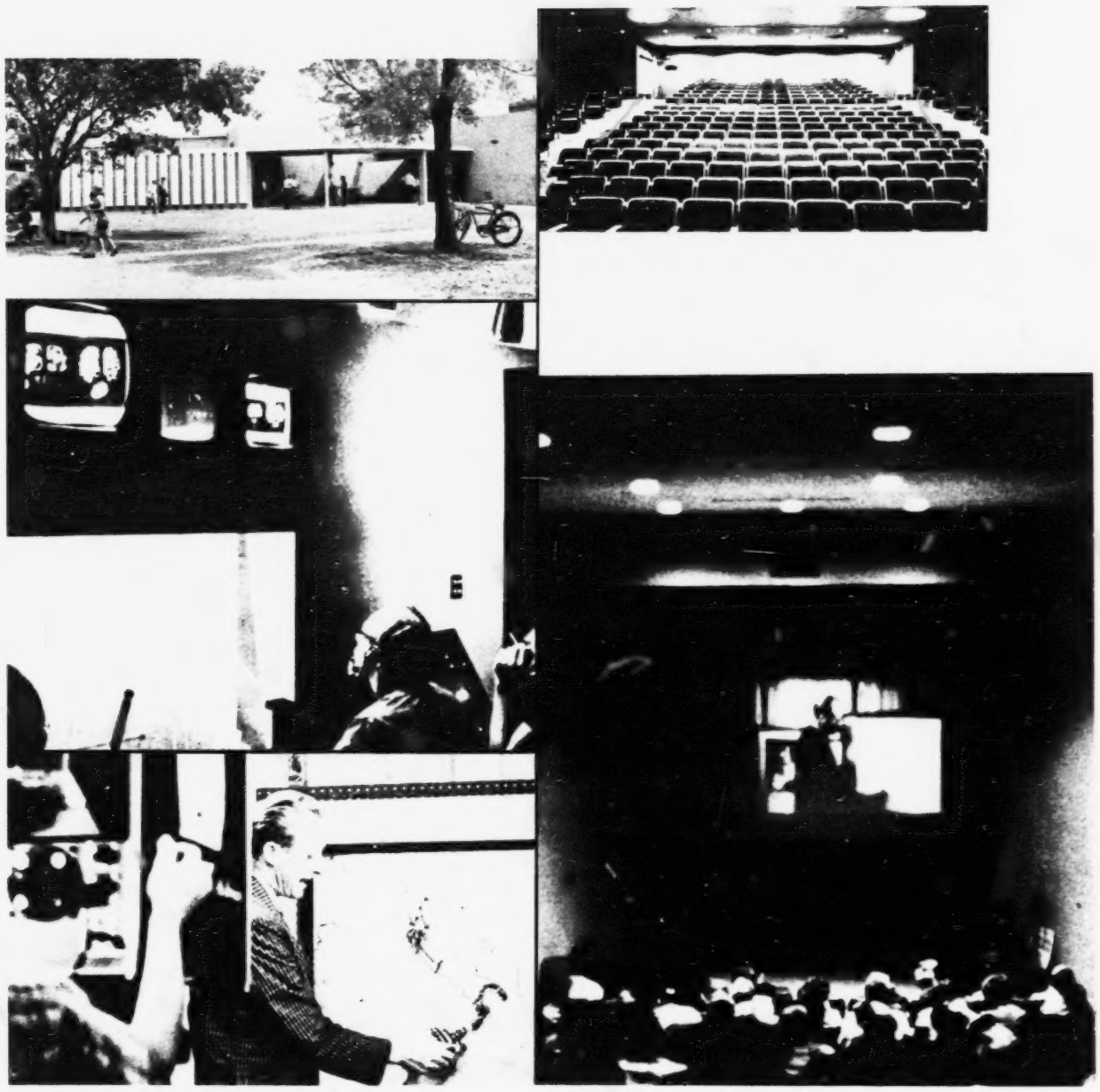
The twenty-seven colleges and universities in this program have adopted diverse approaches and practices in organizing for instructional television. Transmission and distribution arrangements vary from campus to campus. About half use closed circuit television, in which the signal is distributed from a campus studio to the classroom receiving sets by means of cable or microwave (point-to-point) transmission. The other half use broadcast transmitters to send the signals from the studios to the classrooms. In some cases these broadcast transmissions are of the UHF type (channels 14-83) which, in view of the limited number of sets equipped to receive UHF signals, are in effect almost closed

circuit. Most of the broadcast courses, however, are transmitted on the VHF channels of non-commercial, educational television stations.

Among the broadcast courses, whether UHF or VHF, some originate in studios equipped with low-budget vidicon cameras, others in studios using the standard image orthicon cameras.

Recording proceeds in different ways, each having its own advantages. A course may be taught live in the morning and taped at the same time, to be broadcast again at an afternoon hour—this procedure enabling the instructor to observe student response to his presentation during the afternoon classroom reception. Some professors prefer to have the experience of first giving their instruction live, making desired improvements, and then taping it for a subsequent class hour. At several universities courses are taught live for one or two semesters, with the professor continuing to make revisions and improvements until he has had enough experience with the television course to consider himself ready for taping. One group of professors tape the first year, and then spend subsequent semesters in selective retaping—redoing the less successful lectures and editing and revising others to keep the series as versatile and dynamic as possible. Obviously, the high cost of videotaping demands that careful thought be given to the ways in which it is used.

The investment in television production and recording equipment is a heavy one for most institutions (ranging from $50,000 to $500,000 and averaging about $200,000), and as a result, there remain other areas in the television system, notably reception facilities and, in some cases, visual materials and graphics, which have to make do on comparatively low budgets. In nearly all cases the number of full-time television technicians (directors, cameramen, engineers, etc.) is minimal, and their hours are long and rushed. This frequently means sacrificing camera rehearsals in the studios and doing without some of the close interaction between production and teaching personnel that is so essential in fulfilling the potentials of the TV medium. Thus, production of the television courses is generally a lean and hard operation requiring much dedication on the part of both the professors and the technical personnel. Instructional television is still a pioneering venture, brought into being by people who often show some of the qualities of the American frontier as noted by Frederick Jackson Turner: "That coarseness and strength combined with acuteness and inquisitiveness; that practical, inventive turn of mind, quick to find expedient; that masterful grasp of material things, lacking in the artistic but powerful to effect great ends; that restless, nervous energy; that dominant individualism, working for



The Audiovisual Instructional Center at the University of Miami

good and for evil, and withal that buoyancy and exuberance which comes with freedom . . ." Expensive as television appears to college business managers, many of its costs are still hidden and are being paid out of the "hides" of its self-sacrificing pioneers who have found expedient ways to go ahead even when budgets are pinched: witness a Professor Brown making his slides at home.

The television lectures are viewed by the students in whatever classrooms happen to be available, large or small. A few institutions use auditoriums or lecture halls. The University of Miami, in Florida, has a new Undergraduate Teaching Center which is specially designed for effective use of audiovisual resources.* In nearly all colleges the television sound comes out of small, front-facing speakers mounted below or above the usual 21-inch sets in the receiving areas. These speakers are of the small home television type and are inadequate for such large spaces. The spaces themselves are nearly all pre-television in design, and their acoustics, poorly designed for conventional classroom instruction, are noticeably worsened in combination with the substandard television sound reproduction. Most professors and students regard such conditions as being barely adequate.

Most telecourses are being used for credit only in the classrooms of the same campus which produced them, but in three areas supported by the Program (Florida, Texas, and Oregon) there is a beginning of "network" reception or exchange of courses among a number of institutions.

The institutions which received grants under the Program report a background of common problems doubtless contributing much to the initial decision for television utilization. Fifteen are large state colleges and universities experiencing increased enrollment pressures. Five are large city colleges or universities (one, privately supported) which are also expanding rapidly in enrollment. There are two rapidly growing junior colleges in Florida. Three religious denominational institutions are included. Finally, two of the institutions are unique in their categories: a small woman's college and a small private college of education. The pattern of enrollment increase evident at most of these institutions is almost everywhere accompanied by worries over the corresponding requirements for larger teaching staffs, more classroom and laboratory facilities, and more money to finance all of these. In view of this common background of quantitative problems it is encouraging to find that practically every institution in the group has approached

*The Center was described in *College News Letter No. 1* issued by the Educational Facilities Laboratories, 477 Mdison Avenue, New York City.

the use of television with a determination to achieve through it, first of all, a qualitative upgrading of instruction wherever it is introduced.

Seventy-six courses were supported under the Released Time Program, approximately thirty-seven per cent of these in the area of the humanities, thirty-one per cent in the physical sciences and mathematics, nineteen per cent in the social sciences, and thirteen per cent in vocational or pre-professional areas. At the same time that the institutions were offering these courses under the Program they were also offering almost as many (sixty-seven) additional television courses entirely "on their own," without Foundation support. In some cases these were courses which antedated the Program. In other cases they were added after the grant funds had been expended or they were courses which did not fulfill all of the Program criteria.

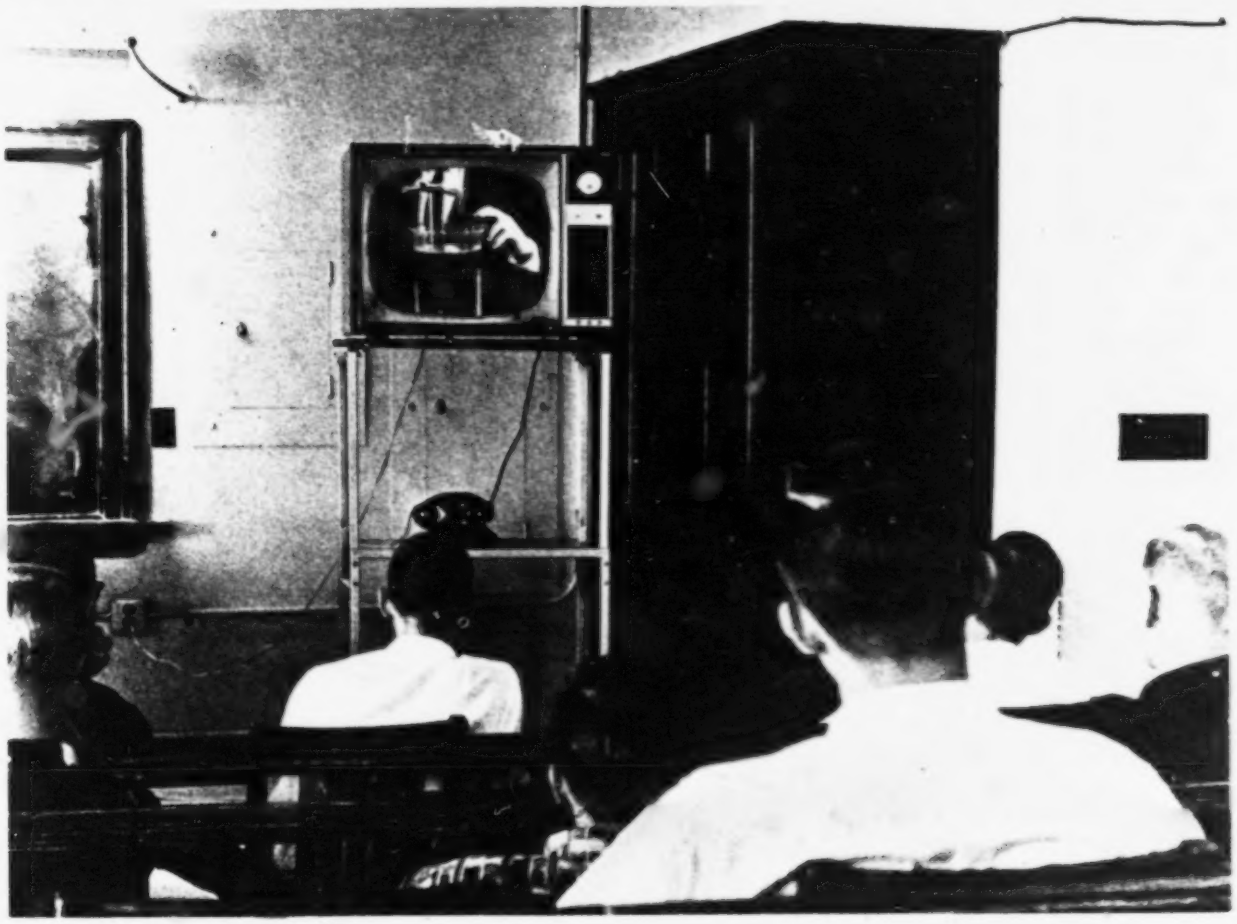
The typical institution in the Program is a university of more than 5,000 enrollment offering two courses with Program support plus two additional courses without such support. The courses are on the freshman or sophomore level and are offered for regular, residential credit, three hours per semester. The standard three meetings weekly usually become in such courses two forty-five minute television presentations plus one classroom discussion meeting of similar length. In some cases the discussions occur in large classrooms with many students participating; in others the group is divided into small units meeting separately. Individual conferences (often on a volunteer basis) may supplement the television presentation; in the sciences, laboratory work is usually a required supplement.

Most of the professors giving the television lectures had had more than twenty years of teaching experience before undertaking the telecourse. When they began the television work their only training for it was usually of the "on the job" type, and their hours of involvement with television were heavy from the beginning—on the average, thirty-seven hours per week devoted to preparation for the lecture, searching for or making visual materials, writing, rehearsing, producing, recording, and in some cases, rerecording.

If his course is recorded the professor may meet with one or more of the discussion groups in person, or he may arrange for these groups to be met by other faculty members of the department or by graduate assistants. In some institutions there has been an attempt to encourage discussion leadership by the superior students in the class or by upperclassmen, with or without faculty present.

The courses range in enrollment from 2,600 students to ten, with the average being about 460. (Appendix III contains a list of the courses

THE UNIVERSITY



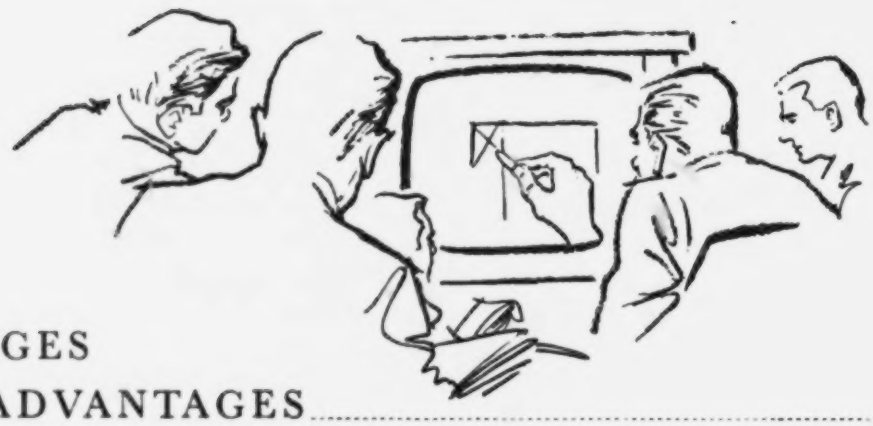
arranged in order of size, and Appendix IV shows those which are recorded on videotape for relatively permanent retention, with the name of the professor to whom those interested in the possibility of screening copies might make inquiry.) Whether live or recorded, each television presentation in the large enrollment courses is usually transmitted more than once; for example, in the morning and then in the afternoon or evening of the same day. This allows some flexibility in course schedules, and it also enables those students who have difficulty with a presentation to return for another viewing.

Seventeen of the courses are accompanied by teachers' manuals for the use of the participating proctors in the classrooms, and forty-six have study guides for the students. These study guides, either mimeographed or printed, usually resemble an eighty or ninety page set of course notes, together with a course outline, assignments, and bibliography. Such materials may be designed for use with a specific textbook. The study guide is often conceived by the professor as a means to free students from lengthy note-taking during the lectures, thus enabling them to concentrate more fully on the screen presentation.

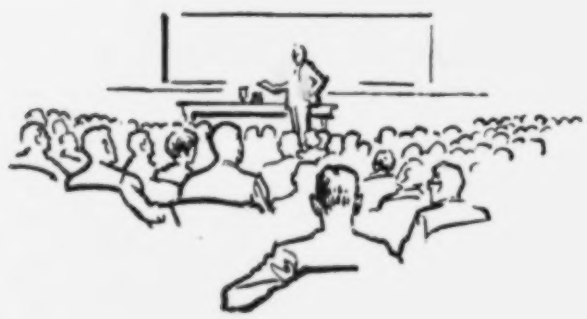
In summary, three important sets of variables are commonly present in the operations of colleges and universities now using television for instruction. Their courses may be:

1. Telecast live or recorded (in the latter case, either recorded temporarily for short-term delayed use or permanently for indefinite use).
2. Telecast over closed-circuit (cable or microwave) facilities or over broadcast facilities (UHF or VHF).
3. Offered for formal credit in one or in more than one institution.

Every institution using television has its own unique combination of these variables, from the small institution with a live, closed-circuit course offered only for its own campus to the large institution with a permanently recorded course being broadcast for multi-institutional credit.



ADVANTAGES AND DISADVANTAGES



MOST PEOPLE quickly see that college-level instruction by television has both advantages and disadvantages and that a final judgment of it must take both into consideration. Among those who have actually tried out television—faculty, students and administrators—we find a continuing statement of these advantages and disadvantages. Problems and difficulties experienced on one campus, however, may not have arisen on another, just as successes in one area may not have been duplicated in another. For this reason one can find opposite judgments about teaching with television.

The advantage most often cited by the professor is that television makes it possible for him to give lectures that are better than any he has given before. Students concur that the lectures are improved. For some professors, the improvement is explained by the fact that they have been given full released time to prepare the course. This is not to take credit away from television—for the professors never had the time to invest such care and work in a single course before television came along, and they never expect their departments to be able to afford it apart from television. The fact seems to be that television makes possible a new logistics of teaching which, by increasing the output per man hour, provides the means for creating a better product. Thus, the time required for one man to give multiple presentations of the same lecture or for a team of instructors to present the same material to numerous groups of students is, with television, devoted to one carefully prepared

presentation for large numbers of students at once. Even when the professor is given assistants to help collect materials and visuals—help highly recommended by the professors fortunate enough to have it—the logistics may be in favor of television; for the number of students enrolled is often greater than could be handled by the entire team of available teachers in conventional classes.

Having the time to concentrate on one course, most of the professors have substantially reorganized their traditional way of teaching in translating their material into the new medium. The new course is tighter, more rigorous, more condensed yet it covers more subject matter in less time. As a result, students occasionally make unfavorable comparisons with a professor's other courses; student expectations have been raised by the better organized lectures, and the telecourse is for them proof of what might be done in all courses. Professors acknowledge that part of the stimulation and challenge to improve their lectures also comes from the fact that television has opened their teaching to wider observation by colleagues and administrators. On the other hand, the loss of the closed classroom environment has posed inconveniences for those who feel that administrators already know enough about and have enough authority over the techniques of instruction used by individual professors in their own classes.

Both teachers and students attribute part of the improvement in quality to the fact that television permits the professor to do things in his lectures that he could never do before, or at least not as well: present close-ups—even microscopic ones—of maps, drawings, demonstrations; bring to the classroom great events in live or recorded form, together with interviews of important figures; tap all the wealth of films; make direct eye contact with every viewer; employ a range of graphic and animated techniques that the camera alone can create. Visual aids did not originate with the television medium, and while they can be effectively employed apart from television in a variety of classroom situations, the fact is that they usually are not. The budget hasn't been provided for them, and the professor with a full teaching load hasn't the time to prepare them, even if money were available. In the television course, the number of students that can be reached at once and the greater ease of presenting visual and graphic materials seem to justify the extra effort that is taken in preparation, even to the extent of having drawings and maps tailored to the needs of each lecture and having film especially shot.

In seeking to exploit the potentials of the new medium, telecourse professors have had to discover how complex and frustrating can be the

The telecourse professor and the cameraman discuss a camera shot in preparation for taping a Humanities lecture which draws upon ancient calligraphy, scroll paintings and a demonstration of Kabuki make-up with two Japanese guests.

problem of tracing copyright ownership of the materials they wish to use in their broadcasts and of arranging for their release for educational uses. They have found that the word "television" has become an unfortunate added burden, conjuring up from the subconscious visions of affluence and unlimited budgets. The charges for using films, film footage, and photographs in telecourses, especially when broadcast rather than closed-circuit television is involved, can be far beyond the resources of individual college budgets. It is for this reason that many of the institutions in the Program would like to see a central distribution center of filmed materials produced or cleared for educational television which could be made available at cost.

Videotape offers another dimension to the quality of television instruction, the implications of which have not yet been fully assessed. Because of videotape, faculty can continue when ill or absent to meet classes with prerecorded lectures—for example, the lectures of two telecourse professors are being broadcast while they themselves are away on sabbatical leave. The recorded lecture relieves the professor of much semester-to-semester parroting of himself, and it enables him to see and criticize himself in action. When professors undertake to tape and save their television lectures, they tend to make them more polished and to strive for production standards that exploit the unique potentials of the television medium. But making these reinforced lectures involves exhausting work for the professor, and under the dual pressures of teaching and production, they frequently have found that preparing and recording a single set of course lectures, even with a year's full released time, is almost more than they had bargained for.

Some faculty members see in television recordings a threat of potential exploitation of the professor unless agreements are worked out in advance regarding rights of revision, terms of intra- and inter-institutional use, and provisions for royalty payments wherever appropriate. A few such agreements have been made. A videotape recording is in many respects like a textbook and it is felt that something of the same protection accorded to writers should now be extended to the creators of taped courses.[1]

[1]The American Association of University Professors has adopted a statement on the question of rights and royalties in TV teaching which is published in their June, 1961 *Bulletin*. The American Council on Education is studying the problem under a grant from the NDEA Title VII entitled "A Study of the Problem of Copyrights, Royalties, Compensation and Rights of Teachers in the Production, Performance and Distribution of Educational Television and Radio Programs, Educational Films and Programmed Materials." The National Education Association sponsored a work conference in Washington, D. C., Mar. 15-17, 1962 on "Professorial Rights & Responsibilities in Relation to Newer Educational Media."

The fear has also been expressed that putting lectures on videotape will tend to freeze them and lead to their repeated use even after parts of them become outdated. This may be the fear of normal human inertia and no more justified than the fear that writing lectures on paper would freeze them; for videotape makes possible easy erasure of part or all of a recorded lecture and its replacement by an improved or updated presentation on the same tape at minimal expense. Moreover, the terms of revision of taped copies may be clearly specified in advance of production and distribution, including the right to revised copies in use at other institutions.

Telecourse professors feel some resentment at the fact that their hard work in the new medium is generally not sufficiently recognized. They point out that prestige and promotion on campus still come primarily from research and publication. However, in the institutions which have been using television longest, the professors who have been the pioneers in the new medium seem generally to have fared at least as well as their colleagues in salary and promotion; some may even have fared better with the wider observation of their work which television made possible.

Most of the professors in the Program are agreed that television has a real potential as a replacement for the very large lecture classes where many students have difficulty seeing demonstrations or asking questions. Few suggest that it be extended to small classes. A professor meeting in person with a small group of students is still regarded as ideal. But with the conventional mass lectures transferred to television the students can at least see, not only demonstrations and graphic presentations, but also the professor's facial expression. Students report that the professor seems to be looking directly at each of them all the time; some professors believe that they can achieve, in a television presentation, a quality of intimacy and a conversational tone that are impossible to manage in a large lecture hall. And the psychological impact on students is stronger, they believe, because of the eye contact and image enlargement.

Although they may favor TV for many reasons, most telecourse professors regret the loss of direct personal contact with students in the classroom. Lack of opportunity for immediate feedback of student reactions, classroom discussion, and questions is generally considered a very real handicap and disadvantage, both by the students and by professors. Students miss the opportunity to ask questions on the spot, although they may admit that they seldom use the privilege when they have it. Freshmen and sophomore students particularly balk at the "impersonality" of the TV class—although they may feel they know the professor on camera, he sometimes does not get to know them.

One way of minimizing these disadvantages has been to limit the television lectures to two per week and to hold one weekly classroom discussion session weekly. A few institutions have provided "talk-back" facilities in which classrooms and studio are interconnected and students can ask questions immediately. Experience has shown, however, that these facilities are not used much unless deliberate efforts are made to stimulate such use. Moreover, the facilities become obsolete as soon as videotape recordings are used instead of the "live" broadcast. Some of the colleges are exploring ways of simulating discussion sessions by telecasting dialogues between two professors. Other methods of supplementing student-teacher contact have included individual conference appointments, the assigning of frequent theme writing, and scheduling office hours for telephoned questions.

The experience of a lecture free from all interruptions and without direct confrontation of student and teacher is apparently not an unmitigated loss. As one student wrote about the TV lecture, "It is never late, always present, and has no human foibles such as favoritism and anger that waste precious class time." Also eliminated in the process, says another student, is the "show-off who gives such lengthy answers to questions asked by the instructor that much of class time is used for the students' views. I would prefer the views of a professor." The more mature students say that postponing discussion until later in the week results in more thoughtful questions and challenges them to exercise a greater measure of responsibility and initiative in seeking out answers on their own. However, the less able student sometimes finds that an unanswered question in the early part of a lecture prevents his fully understanding the subject as it is developed in the remainder of the lecture.

The lack of adequate feedback from his students sometimes results in the professor's television lectures moving too fast. When written material is presented on the screen instead of in the manual or in other duplicated form, students may find that the camera is not well paced for note-taking. It moves on before they are finished and there is no way to call it back. This is only one aspect of the general problem of pacing which is a serious one, especially in new telecourses. There is a tendency for telecourse professors to move faster than they normally would as they confront the time pressures and mechanical environment of the studio. Some have found that experienced producer-directors can be of great assistance in achieving the proper rate of delivery. When there is sufficient opportunity for dry runs and camera rehearsals, there is the chance to work out timing with the crew so that the camera follows the teacher, and not vice versa. Perhaps the best safeguard lies in the pro-

fessor's instinctive habit of pacing which comes from long teaching experience. Some professors have sought to reinforce their sense of pacing by taking one of the discussion sections themselves, by frequent conferences with proctors, by pre-testing their basic lectures on live classes, and by giving written assignments. A token class of four or five in the studio is sometimes used as a guide when a professor is giving his first set of lectures on television, but this device is usually discarded in later semesters when he has grown more confident that his rate of delivery is generally correct. The studio class seems to have a tendency to leave other viewing students with a spectator psychology.

The more intensive television course with its visual enrichment and concentrated coverage of subject matter has caused some professors to ask whether television teaching will lead to "throwing away" the poorer students. Curiously enough, the mass medium of television seems in some cases to have had the opposite of the leveling effect that might have been anticipated. Professor after professor reports that his students earn more A's and more F's in the television sections—with fewer students in the middle areas. (It should be noted that other instructional television programs, notably Chicago City Junior College and Continental Classroom report only the normal grade distribution in their results.)

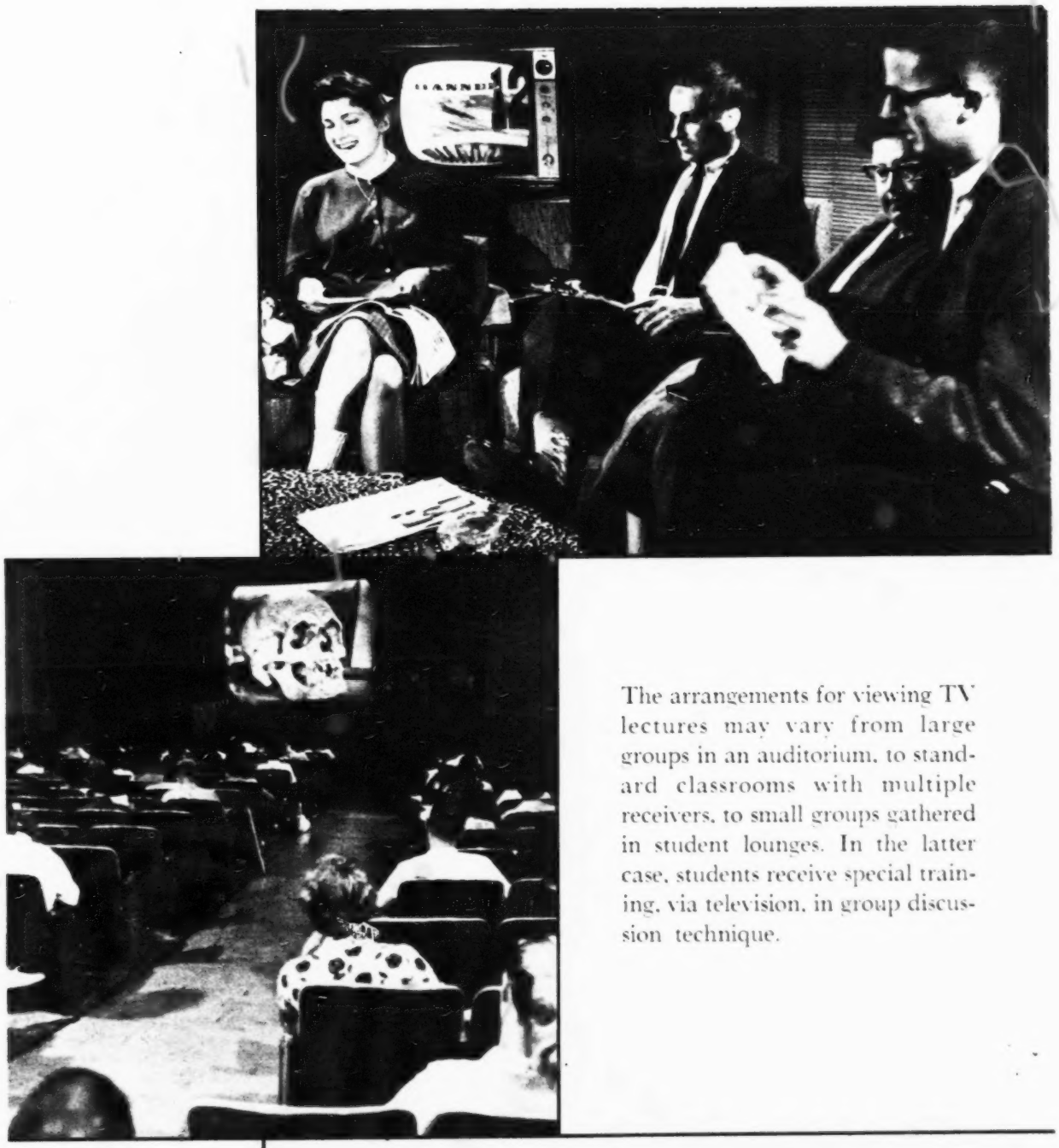
The improvement in individual courses made possible by television might also be expected to have wide repercussions in the quality of instruction generally, and there is evidence in some departments that this is, in fact, happening. If the person giving the television lectures is a superior teacher, and if there is opportunity for junior faculty to observe his teaching, then it is almost inevitable that his lectures will play a part in staff improvement and constitute a form of in-service training. Education in teaching techniques is often missing in the preparation of college and university instructors; so this by-product of television is widely viewed as a welcome development.

Another by-product which many look for in the wider use of the television medium is redeployment of staff in such a way as to provide faculty with more time for research and for individual student contact. A visiting professor from France is said to have returned home indignantly on discovering that the American institution to which he was appointed expected him to give twelve lectures per week. At his French university he was expected to give one or two, at most. "What are you Americans trying to do," he asked, "kill your professors?" There is no example as yet of any American institution moving very far or fast toward the continental ideal, even where television has been introduced; but television professors see in the new medium at least a possibility that

some movement in that desirable direction might eventually be feasible. To non-television professors this is just pie in the sky.

The use of faculty in telecourse viewing rooms has raised problems in college television similar to what has been experienced in school television. The younger faculty assigned as proctors are often expected merely to record absences and keep order during the telecast. They soon feel that their time is largely wasted and that television relegates them to a subordinate and unprofessional role. Such a feeling of dissatisfaction is almost inevitably communicated to the students and affects their attitudes toward the lectures. At the primary and secondary school level it has been found that by far the most effective system is to include the classroom teachers with the television instructor in a team teaching arrangement which assures the full participation of classroom teachers in planning, follow-up criticism, and subsequent modification of lessons. The classroom teacher who has thus been involved in the planning knows what to expect and how best to use the television presentation in the classroom. Similar involvement of proctors at the college level might also prove helpful. At some institutions the length of the telecast has been reduced from its original forty-five minutes to thirty minutes to provide more opportunity for questions and discussion, and this arrangement is more satisfying to the instructors in the receiving rooms. Other institutions, discovering that disciplinary problems during telecasts are far less than anticipated, have eliminated the faculty from proctoring on anything more than a roving basis, and have encouraged greater student responsibility in classroom discussions, occasionally assigning graduate assistants or upperclassmen as discussion leaders.

The universities in the Program have been trying out a variety of television viewing arrangements in an effort to find the most satisfactory ones. Some institutions are moving toward smaller viewing rooms and dispensing altogether with proctors, because they find that learning is more effective and disciplinary problems reduced as the size of the viewing group is decreased. At least one professor has experimented with variations in the size of student viewing groups in order to learn whether a small group meeting regularly will encourage the development of an atmosphere conducive to discussion. A few institutions are trying student viewing in dormitory lounges, and at least one is making plans for individual room viewing in new dormitory construction. Professor Robert Janes who teaches sociology on open circuit (broadcast) television at the University of Illinois, conducted an experiment in which he gave students free choice of viewing areas—classrooms, dormitories, or other residences. Reactions favored the non-classroom situation. The objec-



The arrangements for viewing TV lectures may vary from large groups in an auditorium, to standard classrooms with multiple receivers, to small groups gathered in student lounges. In the latter case, students receive special training, via television, in group discussion technique.

tions to classroom viewing—which disappeared in residence viewing—were these: dislike of large size of group, poor angles of vision to television set, inadequate ventilation, restrictions on smoking, uncomfortable seats, and distracting behavior of other students when no instructor was present in the room.

Students who view the lectures at home find the family environment something of a problem. Telephone calls and other noise, competition for the set, and coping with the general lack of understanding of the family can require enormous student dedication and effort. The husband of a telecourse home viewer reported that during a language drill session, one of his children came to him with the worried question, "Why is mama talking back to television?"

The overall reactions of students to television instruction in this Program have varied widely from cautious rejection to relatively favorable acceptance. There frequently seems to be an initial feeling on the part of a student enrolled in a telecourse that he is unlikely to get his money's worth from this system of teaching. As the course progresses and he finds that he is, in fact, learning as well or better in this way, his feeling tends to shift toward approval of television instruction.

Close attention has been paid, in television research, to the reactions which students have to television courses. The results of numerous careful research studies indicate that there is remarkably little direct relationship between student attitudes toward television instruction and their achievement in the courses. Studies may report a slight preference for conventional instruction, but no statistically significant difference in achievement is discernible between the performance of groups of television enrollees and matched control groups taught by the same professor in the conventional classrooms. Some researchers have come to feel that their measuring devices are simply inadequate to detect the differences which must be present; others say that what they are beginning to uncover is the relatively minor amount which the lecture contributes to the final student achievement. Thus they feel that telecourses which retain the same text, exams, reading, and written assignments and which assign one third of the weekly meetings to discussion, may be providing relatively less change than anyone had thought. Telecourse professors and their students are convinced, nevertheless, that there are very real and important differences, whether measurable or not, between the large class lecture and the telecourse presentation, just as there are between the book and the lecture. Television is, paradoxically, a kind of one-to-one presentation, informal, almost intimate, yet abstract in a way, mind confronting mind.

It has been said that television is already probably the most extensively tested instructional device ever offered to education. Certainly its coming, and the research programs which resulted, have pointed up the fact that, by comparison, we have had amazingly little good research on other and much older instructional devices. Universities are becoming more aware of the successes of research and development in American industrial enterprises and of the need to give some priority to educational research and development. There has been far too little good research into the basic elements and methods of instruction, for example. Have we ever really measured the impact of the live personality factor and the teacher's physical presence? Some professors are beginning to suspect that for the better students, at least, it may be possible to provide more direct and more effective confrontation with the subject itself when the professor gets out of the way.

Faculty in the Released Time Program have done some experimentation in various ways of facilitating discussions within the context of a television course, in the use of segments of programmed instruction inserted in the presentation, and in varying the proportions of television instruction and classroom discussion. Many other variations still need to be tested in more and more refined programs of continuing research. However, no matter what the research results show thus far, some faculty members, on being asked to alter a conventional system of teaching which they feel to be quite successful, have shown great reluctance to change. They have been asked whether the conventional system can really be termed successful—"successful in comparison with what?"—or whether it is merely accepted. Telecourse professors feel that in any case additional research should not stand in the way of getting on with the job of using television regularly, effectively, and with imagination.

Occasionally a professor who reacts against television instruction will dismiss it with the charge that it turns the professor into an actor. Others counter this with the observation that we too seldom realize how large an ingredient of actor is in the best professor. Jacques Barzun finds an important element of the dramatic in all great teaching.

At a few institutions, professors whose courses are broadcast on open circuit television feel that they are spontaneously censoring their lectures out of fear of possible adverse public reaction. Yet others—including literary scholars, psychologists, biologists, social and political scientists —report their amazement and satisfaction with the complete lack of hostile public criticism aimed at the treatment on educational television of such controversial topics as race, evolution, religion, sex, and politics.

Anything as technically complicated as television must present dis-

advantages in occasional breakdowns of equipment and facilities. This has happened in television courses but, in general, it has not happened as often as might have been anticipated. Nevertheless it is pointed out by one professor that education should have at its disposal television facilities that at least equal the quality and reliability of commercial television. In addition to the operational failures, there are certain inherent technical design limitations in the television medium as presently used by most educational institutions. Its lack of color is a handicap to chemists and art professors unless colored illustrations can be presented to the students in the manual or in other ways; its frequency response in music reproduction, especially in the cheaper commercial receivers with small speakers, leaves much to be desired; the resolving power of the American 525-line system is not equal to the demands of art and science professors who want to present a wide expanse of material and intricate detail simultaneously, without recourse to the usual alternating wide shot and close-up sequence in television technique. Yet within the same system limitations there are projection-type sets which can fill a theatre-size screen, and a few institutions have used these with significantly increased psychological impact. Pennsylvania State University experimenters offered students a choice between a new type of large screen television projector and 24-inch sets; they found that seventy per cent of the students chose to watch the large screen. Where only closed-circuit television is used, it is now possible, at greater expense, to obtain special television systems of higher resolution and with color capability.

Some mathematics and accounting professors have found difficulty in presenting long equations and balance sheets on the television screen; either the camera is so close that the whole thing cannot be included, or the camera is so far away that the thing is included but students cannot read the numbers. Overhead projectors have been used to good effect in this situation—after a long shot the camera can move in close or tighten the shot with a zoom lens, thus giving both relationship and detail. Other professors are working on the assumption that the camera should not be required to convey everything; therefore they are preparing supplementary graphic or printed materials that can be distributed before the telecast.

When one proposes the introduction of almost any given course to television it is now usually possible to find someone somewhere who has tried it and concluded that it cannot or should not be done; it is also possible to find others who are doing it and are convinced that it is very effective. Since it is often practically impossible to disengage the peculiar advantages and disadvantages of television for specific areas of instruc-

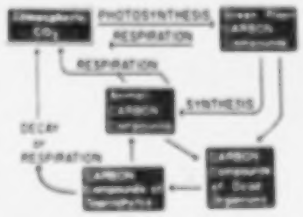
PAGE FROM LESSON OUTLINE IN BIOLOGY WORKBOOK AT UNIVERSITY OF NEW HAMPSHIRE

LESSON #18. CYCLES IN NATURE; TYPES OF INTERACTIONS 33

Since life has existed on earth, there has been enough protoplasm synthesized to constitute a mass several times that of the earth. The chemical elements which make up protoplasm have been used over and over in the synthesis of organic compounds by organisms.

Carbon dioxide constitutes 0.03% of the atmosphere. That is 3 parts in 10,000. This is sufficient for the photosynthetic process for only about 25 years. Respiration and decay return carbon dioxide to the atmosphere at about the same rate as it is removed by photosynthesis.

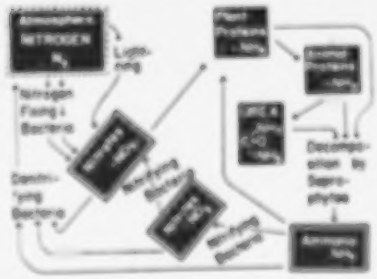
CARBON CYCLE DIAGRAM



Nitrogen Fixing Bacteria include:
AZOTOBACTER, an aerobic form (free in soil).
CLOSTERIDIUM, an anaerobic form (free in soil).
RHIZOBIUM, in root nodules of leguminous plants.

Certain blue green algae, such as NOSTOC, can also fix free nitrogen.

NITROGEN CYCLE DIAGRAM



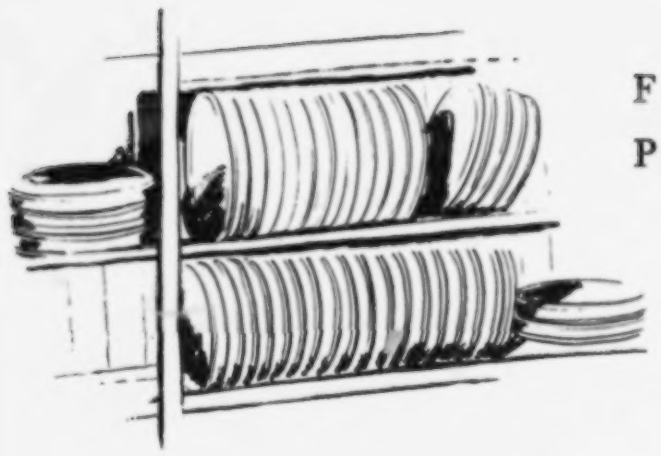
The PHOSPHOROUS CYCLE appears to be an unbalanced one since phosphates are highly soluble and are carried to the ocean with run off water. Many phosphate compounds are locked up in the deep non-productive waters of the ocean. Upwellings of subsurface water result in certain highly productive oceanic areas.

CHEMICAL ELEMENTS pass from organisms to organisms and to the inorganic world in CLOSED CYCLES BY SERIES OF CHEMICAL CHANGES.

The camera "teaches"—moving over diagrams and charts it guides the student and directs his attention to important detail, but most of the illustrations are reproduced in whole in the workbook obviating the necessity of lengthy note-taking. Says the workbook: "The student will find that if he has familiarized himself with the outline before viewing the lesson, he will have time to 'watch' and 'listen' to the lesson while it is being presented."

tion, a group of quotations from telecourse professors giving their reactions to the medium in summary has been included as Appendix V. These quotations are arranged so that those pertaining to the same or related fields appear together, thus enabling the reader to make his own comparisons.

By offering better instruction to more students, television impresses its users as a highly efficient method of teaching in which the advantages definitely outweigh the disadvantages. It is probably destined to be found ultimately efficient also in its cost per student. Many of the courses currently taught by television do not yet have the size of enrollments that would make them demonstrably more efficient in cost, but most are in areas where larger enrollments are expected. Videotape recordings and the size of the class are two key elements in assessing the costs of televised instruction. The question is a very complicated one, and no effort was made in this Program to make comparative cost analyses. Fortunately the Program had among its telecourse professors an economist, Dr. Donald W. Paden of the University of Illinois, who has written a report of his experience, including a careful analysis of the factors that enter into cost calculations. He has generously given permission for this work to be included as a part of this report, and it is presented as a Supplement, pages 65 to 88.



FUTURE POSSIBILITIES

THIS CENTURY has seen the passing of the little red school house and its accompanying world in which mass communications played little part. Our modern, centralized schools exist in a society that is inundated by mass communications. Continuing increases in enrollment have brought us overcrowded classrooms, insufficient building space, and acute shortage of qualified teachers. These pressures coincide with our recognition of an increasing need to raise the quality of education in all areas. We are beginning to look upon brainpower as the greatest of all national resources. We want to find and develop all of the unrecognized geniuses in whatever social or economic context they happen to appear, and at the same time that we feel this pressing need to provide special educational opportunities for the gifted, we also feel an obligation to provide special service for the retarded. Meanwhile, the sheer amount of knowledge and information with which education has to deal has multiplied tremendously. On top of all of these problems there is the pressure of time—the urgent need to provide effective long-term leadership for the free world in the mounting international challenge to its very survival. Ours is a situation that calls for daring and imagination at all levels—policy, planning, and implementation.

It is in this context that television as an instrument of college-level instruction has achieved its significant and well confirmed successes, its balance of advantages and disadvantages, over a broad base of trial in its first decade of existence. Yet we must assume that our experience of the medium thus far has been largely characterized by first generation thinking, the kind of anachronism that kept the motor car looking like the buggy for a time. We must recognize that the first ten years of instructional television have merely established the base from which far more significant results may be achieved in the following decade. In fact, the probable directions of some of these results may already be detected in the present situation.

Practically everyone engaged in telecourse instruction, from the professor to the lowliest studio assistant, is convinced that the qualitative potential of the medium far exceeds present performance. This conviction does not concern primarily the technical quality of the production but rather the qualitative impact of the instruction conveyed by means of the medium. Wilbur Schramm points out that in nearly four hundred scientifically designed experimental comparisons eighty-six per cent "resulted in as much or more learning in a television, as compared to a conventional, classroom."[1] But television users expect such results, impressive as they are, to be substantially improved when telecourses can afford to include such elements as professional art work and graphics, animation, filmed sequences, carefully prepared demonstrations, recorded statements by the greatest living authorities in every specialty—all of the industrial, scientific, artistic, and cultural resources now occasionally introduced to such good effect in commercial television spectaculars. Greater improvement will also come when TV teachers are assigned sufficient staff assistance and professional production personnel and when these teaching-producing teams are given the time to plan and prepare the quality of instruction which they know is possible with the aid of television. If the institutions now active in a number of telecourse areas could pool their efforts in cooperative pre-planning, production, and utilization, many of the potential improvements could be realized. Cooperation is the key to the greatest possible quality, and quality is the key to broader television acceptance, utilization, and budgeting.

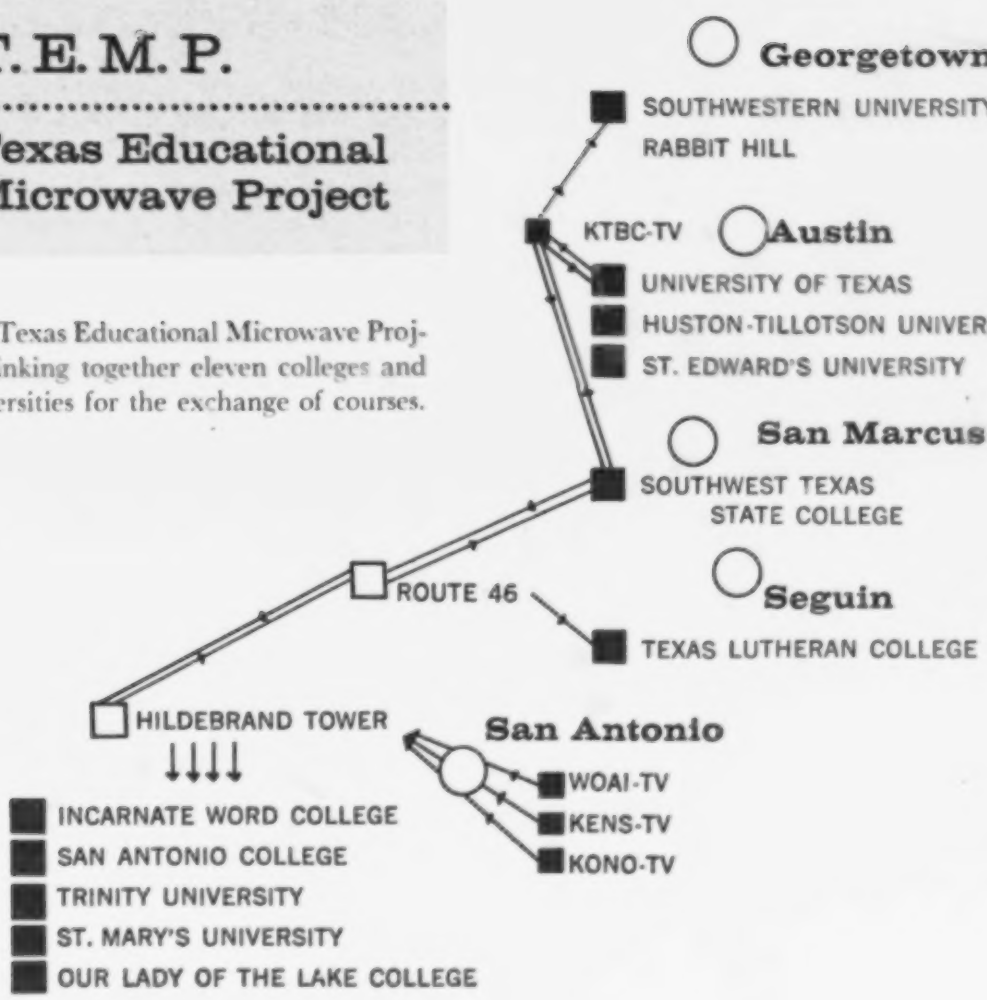
There are already in operation a number of cooperative educational television installations, involving broadcast state and regional networks and closed-circuit or tape exchanges. Alabama has three broadcast stations linked together by microwave, including studio facilities at both the University of Alabama and Auburn University. Educational stations in San Francisco and Sacramento are now linked together by microwave. Florida has five stations in operation, with two of them connected by microwave and all included in a tape exchange service for the benefit of state junior colleges. In Minnesota fifteen small colleges cooperate in course offerings over the Minneapolis-St. Paul station. In the Northeast region, the Eastern Educational Network with headquarters at WGBH-TV in Boston has been formed for the purpose of exchanging programs, and six stations are now interconnected via a combination of leased lines, off-the-air pick-up and microwave relay. North Carolina

[1]Schramm, Wilbur—*Educational Television, The Next Ten Years,* Institute for Communication Research, Stanford University, Stanford, California, 1962.

T. E. M. P.

Texas Educational Microwave Project

The Texas Educational Microwave Project linking together eleven colleges and universities for the exchange of courses.



COURSE	INSTRUCTOR	INSTITUTION	NO. OF INSTITUTIONS UTILIZING COURSE
AMERICAN HISTORY	DAVID TRIMBLE, PH. D.	SAN ANTONIO COLLEGE	8
COLLEGE CHEMISTRY	L. O. MORGAN, PH. D.	THE UNIVERSITY OF TEXAS	9
FOCUS ON GERMAN	LEROY SHAW, PH. D.	THE UNIVERSITY OF TEXAS	9
GREAT PLAINS	WALTER PRESCOTT WEBB, PH. D.	THE UNIVERSITY OF TEXAS	8
INTRODUCTION TO PSYCHOLOGY	FILLMORE SANFORD, PH. D.	THE UNIVERSITY OF TEXAS	10
MODERN MATHEMATICS	JAMES GRAY, PH. D.	ST. MARY'S UNIVERSITY	8
MUSIC APPRECIATION	MARJORIE WALTHALL, PH. D.	SAN ANTONIO COLLEGE	6
SCIENCE FOR ELEM. TEACH.	R. T. GARY, PH. D.	SOUTHWEST TEXAS STATE COLLEGE	5

has a central educational television transmitter which is alternately served by production studios at the University of North Carolina in Chapel Hill, at North Carolina State College in Raleigh, and by Woman's College in Greensboro. Oklahoma has a two-station, off-the-air pick-up and rebroadcast system with one station having a studio on the campus of the University of Oklahoma in Norman. Oregon has an educational television transmitter in Corvallis with studios at Oregon State College and the University of Oregon in Eugene developing exchanges between these and other institutions and also with the educational station in Portland. Texas has eleven institutions of higher learning linked together by microwave facilities for course exchange in the Austin-San Antonio area.

These installations have at least the potential of cooperative course development among a number of institutions, and actual exchanges have begun in most of these locations. Other similar installations are under development. It seems reasonable to expect that the inherent logic of cooperating to avoid wasteful duplication of effort will prevail over individual institutional efforts. However, to achieve a base of utilization and support broad enough to mount the kinds of qualitative improvements envisioned, the cooperative college-level exchanges of the future will probably need to embrace entire states and regions. To serve these regional installations with copyright negotiations, with an audio-visual library of insert materials, with informational conference-workshop functions, and with production, duplication, and distribution services, there must also be a national center. American experience in the political field has been that no matter how ideal and desirable cooperation for the common good may be, it does not effectively come into being until it becomes the full-time business of some central agency. It cannot realistically be expected to come about through the part-time efforts of any number of agencies. Even with full-time centralized agencies, there might still remain much duplication of effort, but this would be far less wasteful than the utter fragmentation of effort which a system of entirely local production would involve. The goal of educational television should always be to provide a wealth of choice to the local institution, preferably a choice no more restricted than that list of nationally recognized textbooks which almost any professor finds available in his field.

The idea of a central library or libraries of filmed or taped recordings specifically for formal instructional use will open up entirely new dimensions of quality for which future generations will give thanks. A well planned and sustained program of recording statements by the great intellectual leaders of our time would be the beginning of a cumulative

educational achievement of major proportions. In a world equipped with the necessary recording facilities we would expect to find, perhaps in numerous places, sound and picture recordings of the great political figures. But the same *laissez-faire* policy that would produce these recordings almost automatically could not be relied on to produce the others, the recordings of intellectual and cultural leaders. There needs to be an agency which will be charged with looking after our common good in the matter of such recordings, whether they are immediately and monetarily profitable or not.

The Magnuson-Roberts Educational Television Act passed by Congress in the spring of 1962 is stimulating the activation of many additional stations around the country, and the interconnection of these stations through regional and national centers is the logical next development. We have seen over the last ten or fifteen years that the growth of commercial networks has not been primarily the result of spontaneous uniting by local stations. Rather, the process has moved in the opposite direction: national corporations moved by the profit motive have carefully put together their networks of affiliates on the basis of markets, their number, size, coverage, etc. In the case of educational stations we should not expect to see this direction reversed merely because profit is not the motive. There is an even more fundamental matter of leadership involved, whatever the motivation, and in order to secure the strength which goes with union, the strength of more centralized production and distribution, educational stations and closed circuit installations may be expected to find national leadership both in the formal, instructional area and in the area of informal, cultural programming. The National Educational Television and Radio Center with its headquarters now located in New York City has devoted itself primarily to the latter area since its beginning in 1953. Now, with the aid of $240,000 in Title VII funds under the National Defense Education Act, this Center is conducting a pilot exploration of a national instructional materials library. Related regional distribution centers are also being explored in projects centering in Lincoln, Nebraska, and Boston, Massachusetts.

Beyond the development of a national educational television network and library service we must also expect the development of international cooperation. The Center in New York is already active in this area with its International Division, for example, in the multi-nation, cooperative, documentary film series "Intertel"; and the National Association of Educational Broadcasters in Washington, D. C. has obtained government contracts for educational broadcast development in several foreign countries. We may also see in a few years a great expansion of interna-

tional educational television under the stimulus of communications satellites. Our common language with Canada, Great Britain, Ireland, Australia, New Zealand, and with English-speaking universities in nations like India and Pakistan, already offers a great opportunity for international cooperation in television. Some nations, such as Great Britain, France, and Italy, have another community of interest with us in that they have also developed extensively certain educational uses of television. And yet, the engineers will very probably have multiple satellite relays in operation before the educators are generally awake to the possibilities of international cooperation. As cooperation develops it will probably concentrate on the primary and secondary school levels, although there is already some mention of the tremendous potential of satellites for rapid and widespread dissemination of course materials in a few limited but crucially important subjects at the university level, for example, epidemiology for the continuing education of doctors. The need for continuing education has already been demonstrated in the use of closed-circuit television for post-graduate medical education and in the use of the hospital ship "Hope" as a floating medical classroom in remote harbors of the world.

The principal impact of the satellite development on college-level instruction by television will probably be as a demonstration. The successful use of the medium even in limited areas will give rise to much more extensive developments of a closed-circuit and recorded type.

The circulation of well-known textbooks in many languages provides the pattern and preparation for eventual circulation of recorded course materials in the same languages. Professor Paul Samuelson of the Massachusetts Institute of Technology, for example, is the author of an economics text which has been translated into French, Spanish, German, Italian, Portuguese, Arabic, and other languages. It is not difficult to imagine accompanying films or tapes in many languages utilizing the same basic visual documentation. Foreign materials should never be expected (or allowed) to replace qualified native lecturers, but their use where lecturers are simply not available would provide an instructional resource much better than nothing. It was found in Turkey, for instance, that the Harvey White filmed lectures in high school physics, dubbed with a sound track in Turkish, enabled students working in an extension-type program without a regularly assigned local instructor to do almost as well as students assigned to an inexperienced instructor who used the same set of films in his classes.

We must also expect our participation in international developments to be a two-way street. Many of our universities would be prepared to

take advantage of such educational exchange. Which of them, for example, would not find good use even now for recorded lectures of the great dons of Oxford and Cambridge?

Simultaneous with national and international developments in the extension of educational television, the future doubtless holds important prospects for the progressive integration of television with other instructional media. There are many ways in which the media are complementary; so this process should be of benefit to all. Vice President Thomas C. Pollock of New York University has said: "The educational broadcaster should and, I believe, *will* use his new and powerful electronic medium as a constant companion to an older but still new and increasingly available medium of communication, the printed book. The two are natural stablemates: broadcasting with its wide geographical range and tremendous momentary impact, but time-bound, inevitably fleeting, and repeatable only with difficulty; and the small and modest book, a permanent object, easily transportable, not bound by time, which may be read, re-read, and digested at leisure."

Many people, looking at the commercial development of radio broadcasting today, would be amazed to learn that the first AM radio station in the United States to broadcast regular service began in the Physics Department of the University of Wisconsin in 1919. Through the 1920's science and engineering departments and labs of the land-grant colleges developed more than one hundred radio stations, but they were operated mainly as technical experiments by the engineers who made them. Most of these stations withered away in neglect as educators failed to conceive a use for them within the main stream of education. Now the flooding of the educational television channels may well lead to ancillary redevelopments in educational radio. Radio lessons accompanied by printed and illustrated student manuals could offer instruction much more cheaply and as effectively as much that goes onto educational television today.* There may also be developed in the future the simultaneous use of television and radio for separate elements of a common communication problem in education, a concentration of forces, as it were.

Film, also, has strayed far from its beginnings. Thomas A. Edison said: "It may seem curious, but the money end of the motion pictures never hit me the hardest. The feature that did appeal to me about the whole thing was the educational possibilities I thought I could see. I had some glowing dreams about what the camera could be made to do

*England, Australia, France, and the Netherlands are among the countries which already have a well established tradition of broadcasting instruction to the schools by means of radio.

in teaching the world things it needed to know—teaching it in a vivid, direct way." The time is almost ripe for educational film to find its ultimate adjustment to the rise of educational television in a way parallel to that which Hollywood has found with reference to commercial television: not in competition and isolation but in cooperation and integration. Education may well rely on film for its advantages of portability, definition, color, editing, animation, time-lapse, etc. at the same time that it relies on television for its immediacy, flexibility of recording and erasure, simplicity of classroom use, and its speed and economy relative to volume of production. There will doubtless be different assignments for the two media in presentation and follow-up, and there will often be a fusion of the two, as in the television use of film inserts and in the 16 mm. projection of television recordings. Television tape does not make film obsolete; it merely adds an important element of mutability to our battery of facilities for educational communication. This may well be a saving grace for all of the media. A. N. Whitehead wrote: "For successful education there must always be a certain freshness in the knowledge dealt with. It must either be new in itself, or it must be invested with some novelty of application to the new world of new times. Knowledge does not keep any better than fish."

The new self-instructional devices such as teaching machines and programmed books offer very important advantages in some of the areas in which television is weakest: drill, follow-up, acceleration, reinforcement, pacing, etc. It would seem natural, therefore, to expect that television and programmed instruction will both be used more effectively when they are used in correlation with one another.

In addition to its integration within the context of educational media, television will make important new contributions to the quality of instruction when it finds its place within the regular process and organization of higher education. Wilbur Schramm has pointed out that, although most telecourses lean heavily on the lecture method,

> ". . . no college has yet used this concept in what seems to be one of its most exciting applications. Recall the pattern of an English university like Oxford or Cambridge. These universities typically offer a limited series of lectures each year, voluntary to students, and supposedly given by the greatest authorities who care to expose their ideas in this way. Some of the students go to a number of lecture series; some go to almost none. The chief activity of the student is to prepare for a continuing series of intensive tutorial sessions with teachers, to work in laboratories, and to read for a challenging set of examinations. This pattern is one to which tele-

vision seems almost ideally suited. Why not put the best lectures on television, on a voluntary basis? This would require fewer lectures, and better ones. It would leave more time for individual study and guidance. It would put the emphasis where it seems it ought to be: on active learning by the student.

"So far as we know, television has never been employed in that way by an American university. . . ."[1]

New ideas or new applications of ideas often emerge simultaneously in widely scattered points as the opportunities ripen to make them possible of attainment, and this is true of Schramm's idea. It is presently germinating in a number of scattered departments which have had the experience of telecourse instruction. One reason for the delay has been that it has seemed almost too good to be true. Just at the time when American higher education is worried about its financial ability within the present system to raise the salaries of professors as well as to hire new professors and to build more classrooms, here is an idea which suggests that procedural reorganization, involving television, will make it possible to afford what everyone has been taught to believe is an even more expensive system, featuring more individual contact between professors and students than ever before. It is an example of the exciting patterns likely to result in the future from a thorough-going administrative and academic assessment of television's organizational implications as a valid, respectable, and integral part of the instructional process.

The idea of television as an opportunity for more rather than less personal influence in education is a turn-about that may be crucial to future acceptance of the medium. Even books have not yet met this test. John Jay Chapman wrote that "The American mind pictures education as a succession of long lanes with hurdles in them which the scholar must leap over. The hurdles are books . . . The whole system is designed to shackle personal influence." The reason that this is particularly deplorable is that "the essence of education is to inspire, and this is a matter of personal influence . . ."[2]

It is precisely as a vision of human personality engaged in the life of learning that instructional television may have its greatest ultimate impact. John Gardner sees education primarily as a way of life in which schools and colleges ". . . must equip the individual for a never-ending process of learning; they must gird his mind and spirit for the constant reshaping and re-examination of himself. They cannot content themselves with the time-honored process of stuffing students like sausages or

[1]Schramm, Wilbur, *Ibid.*

[2]John Jay Chapman, *New Horizons in American Life*, N. Y.: Columbia.

even the possibly more acceptable process of training them like seals. It is the sacred obligation of the schools and colleges to instill in their students the attitudes toward growth and learning and creativity which will in turn shape the society."[1]

It is clear that television will be vastly underestimated and misused if it becomes primarily a device for conveying information. This is not really what education is about. We must not only enable students to develop their capacities for intellectual operation and stimulate them to the making of intellectual, moral, and aesthetic judgments; we must also teach them to live with the learning and to make it a life-long habit. We must somehow communicate the attitude that colleges are not for bolting knowledge and then getting out as soon as possible; that they are, rather, for learning to know how to learn and why. This may best be accomplished by imitation of those persons, faculty and students, who are already dedicated and initiated into the life of learning. If television can give students a view of authentic genius in action, living a bit of its life of learning and showing its delights even before the cameras, the students will not quibble about many of the other things. They will be willing to give up their right to interrupt and ask questions. They will sometimes even sacrifice the "production values" of maps, charts, and graphs. The younger students who have been conditioned to yearn for the pat on the head, the chance not so much to know as to be known and recognized, to make an impression or to gain sympathy, will find that the one-way vision is more than adequate compensation for what they will have lost. For in place of being seen they will have an unusual opportunity to see a translucent teaching personality who does not block the view of his subject but presents it compellingly as an important part of a way of life worth the living.

Suppose that we use television to extend the presence of an inspiring teacher beyond his immediate physical environment into a condition of virtual presence which, with recording, is largely independent of temporal as well as spatial limitations. Let us assume that the students have textbooks and television manuals, as well, and, far more important, immediate access to the entire world of books in great libraries. Then we further extend the students' learning environment with teaching machines for orderly pacing and reinforcement in the acquisition of related factual information. Say that we use film for direct review of the same core inserts originally presented in the television context. If the subject is a foreign language let us have language audio tapes for drill in pronunciation. We must not forget, also, to provide opportunities for in-

[1]John W. Gardner, *Excellence*, N. Y.: Harpers, 1961, p. 143.

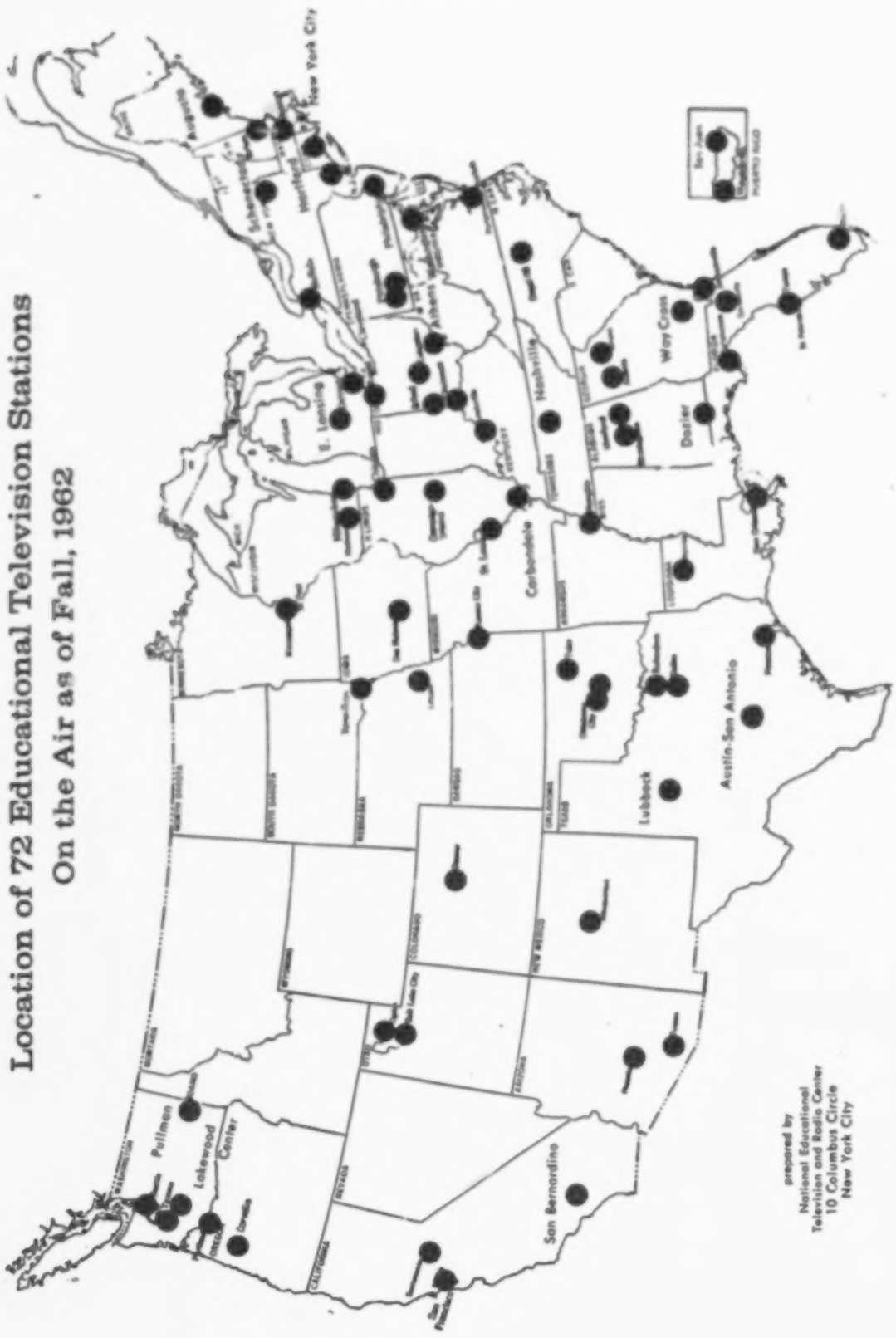
creased student maturity and responsibility — for example, cultural environments making possible student-to-student and informal faculty-student participation in the good citizenship of the intellectual state, the good talk that can be the most exciting product of any campus. Then in the highly professional position of diagnostician of the individual student difficulties in this learning-saturated environment there is the teacher or professor dividing his time between conference and classroom. The prescription containing the proportions of each element in the mix for each student is still in the hands of this person who is a highly professional specialist concentrating not only on up-to-date knowledge of the content field but also on the techniques of its presentation and on personal knowledge of the individual student. In such a team approach, the component elements of the teaching function are separated and transformed; their mix is varied. But personal influence is still in evidence not only in the television presentation but also in the inter-student contacts and in the classroom or tutorial meetings.

We may expect increasing future use of instructional television in all or part of this pattern, both in the schools and colleges. Beyond the immediate, personal impact of the telecourse professor which will result from this highly specialized use of the medium, it is also clear that television will help to bring the profession of teaching to a twentieth century stature by making for conservation of talent in three ways: as a cumulative record of the best work by the greatest teachers henceforward, as an extensive opportunity for uncovering hidden student talent because of maximal access to inspiring instruction, and as a follow-up device for continuing education of students in later life in order to reduce the mortality rate of the intellectual life.

This kind of development will pose no small challenge for the telecourse professor, but it will not require him to be a "personality kid." He is in no danger from the actor with pear-shaped tones. For if the actor were to be allowed to memorize the professor's lecture and to speak it to the camera, even if the students showed "no statistically significant difference" in test scores, we would have a far more deplorable fraud than that of the quiz shows. There the deception involved the seeming knowledge of answers to particular questions, with feigned agony in the recall. Here the deception would involve imposture in a way of life implicitly being recommended for imitation by students: not that they should become teachers but that they should become thinkers. The great fact beyond the test scores would be that such a cruel hoax would strike at the heart of teaching, because it would be a fake view of a man at home in his subject, a man who evidently cares and is living

in dedication to what he professes. The vision of instructional television should be authentic, honest, and powerful. The mind has mountains, too, and it is the quality of this landscape which television must now present to its viewers in the farthest distance, both of time and space.

APPENDIX I


Location of 72 Educational Television Stations
On the Air as of Fall, 1962
New York City
Boston
Hartford
Schenectady
Albany
Buffalo
Rochester
Syracuse
Utica
Nashville
Knoxville
Chattanooga
Memphis
Jackson
Dallas
Houston
Austin-San Antonio
Lubbock
Carbondale
E. Lansing
Pullman
Lakewood
Center
San Bernardino
San Juan
prepared by
National Educational
Television and Radio Center
10 Columbus Circle
New York City

APPENDIX II

GRANTS MADE UNDER THE RELEASED TIME PROGRAM

DATE	INSTITUTION	AMOUNT
5/20/59	University of Florida, Gainesville, Fla.	$52,000
7/7/59	Oregon State System of Higher Education, Eugene, Ore.	107,115
7/8/59	University of Illinois, Champaign, Ill.	47,500
7/8/59	University of Arizona, Tucson, Ariz.	57,175
7/8/59	Lindenwood College, St. Charles, Mo.	15,300
7/8/59	Southern Illinois University, Southwestern Illinois Campus, Edwardsville, Ill.	38,460
7/14/59	North Carolina State College, Raleigh, N. C.	18,000
7/22/59	University of Houston, Houston, Texas	18,800
8/28/59	St. Petersburg Junior College, St. Petersburg, Fla.	13,180
9/30/59	Montana State College, Bozeman, Mont.	15,000
2/10/60	University of Texas, Austin, Texas	139,120
2/29/60	Wayne State University, Detroit, Mich.	100,000
3/31/60	University of Missouri, Columbia, Mo.	90,030
4/8/60	University of New Hampshire, Durham, N. H.	51,000
4/19/60	University of Houston, Houston, Texas	22,000
5/26/60	University of Detroit, Detroit, Mich.	24,800
5/31/60	University of Akron, Akron, Ohio	55,640
5/31/60	Central Michigan University, Mt. Pleasant, Mich.	67,561
5/31/60	Pacific Lutheran University, Tacoma, Wash.	60,000
5/31/60	National College of Education, Evanston, Ill.	15,682
5/31/60	University of New Mexico, Albuquerque, N. M.	41,400
8/30/60	Western Michigan University, Kalamazoo, Mich.	35,000
9/9/60	Dade County Junior College, Miami, Fla.	15,000
12/27/60	St. Mary's University, San Antonio, Texas	12,467
12/27/60	San Antonio College, San Antonio, Texas	27,800
12/27/60	Southwest Texas State College, San Marcos, Texas	15,500
2/3/61	University of Miami, Miami, Fla.	72,100
2/3/61	Queens College, Flushing, N. Y.	30,450
3/24/61	University of Florida	26,000

COLLEGE AND UNIVERSITY PARTICIPANTS

faculty released time program for televised courses

1. University of Florida, Gainesville
2. Oregon State System of Higher Education, Eugene
3. University of Arizona, Tucson
4. University of Illinois, Urbana
5. Lindenwood College, St. Charles, Missouri
6. Southern Illinois University, East St. Louis, Illinois campus
7. North Carolina State College, Raleigh
8. University of Houston, Houston, Texas
9. St. Petersburg Junior College, St. Petersburg, Florida
10. Montana State College, Bozeman
11. University of Texas, Austin
12. Wayne State University, Detroit, Michigan
13. University of Missouri, Columbia
14. University of New Hampshire, Durham
15. University of Detroit
16. University of Akron
17. Central Michigan University, Mount Pleasant
18. National College of Education, Evanston, Illinois
19. University of New Mexico, Albuquerque
20. Pacific Lutheran University, Tacoma, Washington
21. Western Michigan University, Kalamazoo
22. Dade County Junior College, Miami, Florida
23. St. Mary's University, San Antonio, Texas
24. San Antonio College, San Antonio, Texas
25. Southwestern Texas State College, San Marcos, Texas
26. University of Miami, Coral Gables, Florida
27. Queens College, Flushing, New York

APPENDIX III

TELECOURSES TAUGHT IN THE RELEASED TIME PROGRAM IN ORDER OF SIZE OF ENROLLMENT

TITLE	ENROLLMENT	INSTITUTION
Development of Western Civilization	2600	University of Miami
Man in Contemporary Society	2600	University of Miami
Composition and Humanities	2300	University of Miami
General Chemistry	1800	Montana State College
Composition and Humanities	1674	University of Miami
General Psychology	1522	Oregon State System
Basic College Mathematics	1437	Dade County Jr. College
Fundamentals of Speech	960	Central Michigan Univ.
Beginning Chemistry	950	University of Florida
Introductory Psychology	900	Wayne State University
General Biology	850	Univ. of New Hampshire
Fundamentals of Chemistry	824	University of Arizona
American Public Education	750	Wayne State University
History of the U. S.	675	San Antonio College
English Life and Literature	663	University of Missouri
General Chemistry	650	University of Texas
General Biology	635	Central Michigan Univ.
American Government	630	Western Michigan Univ.
Modern Mathematics	599	St. Mary's University
General Biology	550	Oregon State System
American Government	509	University of Missouri
Focus on German	494	University of Texas
General Chemistry	480	Wayne State University
General Psychology	457	University of Missouri
Humanities	450	Western Michigan Univ.
Community and Society	435	University of Illinois
Effective Reading and Study	400	University of Houston
Reasoning and Understanding in Science	396	University of Akron
General Hygiene	321	Oregon State System
Effective Speaking	316	University of Akron
Agricultural Economics	302	University of Missouri
Introductory Accounting	300	University of Houston
Elements of Economics	270	University of Illinois
French	250	University of Florida
Bacteriology, Botany & Zoology	250	Wayne State University
Introductory Sociology	240	Southern Illinois Univ.
Survey of World Art	230	University of Arizona
Foundations of American Education	230	Central Michigan Univ.
Chemical Principles	200	Montana State College
American Literature	188	Central Michigan Univ.
Principles of Speech	187	Southern Illinois Univ.

APPENDIX III *continued*

TELECOURSES TAUGHT IN THE RELEASED TIME PROGRAM IN ORDER OF SIZE OF ENROLLMENT

TITLE	ENROLLMENT	INSTITUTION
The Teaching of Arithmetic	180	Wayne State University
Education: Literature for Children	170	Wayne State University
Humanities Survey	160	Wayne State University
Calculus	160	Queens College
Fundamentals of Speech	150	Pacific Lutheran Univ.
U. S. History to 1877	150	University of Florida
Humanities	150	Univ. of New Mexico
Science for Elementary Teachers	148	Southwest Texas State College
Survey of Communications	146	University of Florida
Introduction to English Literature	140	Lindenwood College
Elementary German	140	Queens College
Introduction to Guidance	139	Univ. of New Mexico
International Relations	138	University of Missouri
Inorganic Chemistry & Qualitative Analysis	130	Pacific Lutheran Univ.
Introduction to the Visual Arts	130	University of Texas
Introduction to Psychology	127	University of Texas
Humanities	120	University of Florida
The Great Plains	117	University of Texas
General Zoology	109	Pacific Lutheran Univ.
Introduction to Childhood Education	100	Nat'l College of Education
Biological Science	89	St. Petersburg Jr. College
Agriculture in the Economy	84	University of Missouri
Descriptive Astronomy	77	Oregon State System
Music Appreciation	40	San Antonio College
Basic College Spanish	23	Dade County Jr. College
Philosophies of the Modern State	15	Wayne State University
College Algebra	15	Univ. of North Carolina
Religions of Man	14	St. Petersburg Jr. College
Elementary Spanish	13	University of Arizona
Magazine and Feature Writing	10	University of Florida
Trigonometry	10	University of North Carolina

APPENDIX IV

INVENTORY OF RECORDED COURSES PRODUCED UNDER RELEASED TIME GRANTS

COURSE TITLE	NO. OF SEMESTERS	NO. OF LESSONS & LENGTH OF EACH	NAME OF PROFESSOR	INSTITUTION
DIFFERENTIAL AND INTEGRAL CALCULUS	1	25 — 50 MIN.	DR. LEO ZIPPIN	QUEENS COLLEGE
ELEMENTARY GERMAN	1	26 — 50 MIN.	DR. HAROLD LENZ	QUEENS COLLEGE
SCIENCE FOR ELEMENTARY TEACHERS	2	61 — 45 MIN.	DR. THACHER GARY	SOUTHWEST TEXAS STATE COLLEGE
ELEMENTS OF ECONOMICS	1	28 — 50 MIN.	DR. DONALD PADEN	UNIVERSITY OF ILLINOIS
COMMUNITY & SOCIETY (SOCIOLOGY)	2	60 — 50 MIN.	DR. ROBERT JANES	UNIVERSITY OF ILLINOIS
MODERN MATHEMATICS (ALGEBRA & TRIGONOMETRY)	2	31 — 45 MIN. 37 — 30 MIN.	DR. JAMES GRAY	ST. MARY'S UNIVERSITY
GENERAL PSYCHOLOGY	1	31 — 45 MIN.	DR. FRED MC KINNEY	UNIVERSITY OF MISSOURI
AMERICAN GOVERNMENT	1	32 — 45 MIN.	DR. ROBERT KARSCH	UNIVERSITY OF MISSOURI
AGRICULTURE IN THE ECONOMY	1	32 — 45 MIN.	PROF. STEPHEN WHITTED	UNIVERSITY OF MISSOURI
AGRICULTURAL ECONOMICS	1	44 — 45 MIN.	PROF. J. WENDELL MC KINSEY	UNIVERSITY OF MISSOURI
ENGLISH LIFE & LITERATURE	2	58 — 45 MIN.	PROF. DONALD CLARK	UNIVERSITY OF MISSOURI
INTERNATIONAL RELATIONS	1	31 — 45 MIN.	DR. LOUIS G. KAHLE	UNIVERSITY OF MISSOURI
HISTORY OF THE U. S.	2	61 — 45 MIN.	DR. DAVID TRIMBLE	SAN ANTONIO COLLEGE
MUSIC APPRECIATION	2	60 — 45 MIN.	DR. MARJORIE WALTHALL	SAN ANTONIO COLLEGE
BACTERIOLOGY, BOTANY & ZOOLOGY	1	30 — 45 MIN.	DR. HAROLD ROSSMOORE	WAYNE STATE UNIVERSITY
INTRODUCTORY PSYCHOLOGY	1	30 — 45 MIN.	DR. WM. C. F. KRUEGER	WAYNE STATE UNIVERSITY
EDUCATION: TEACHING OF ARITHMETIC	1	32 — 45 MIN.	DR. CHARLOTTE JUNGE	WAYNE STATE UNIVERSITY
AMERICAN PUBLIC EDUCATION	1	15 — 30 MIN.	DR. WARREN E. GAUERKE	WAYNE STATE UNIVERSITY
PHILOSOPHIES OF THE MODERN STATE	1	40 — 45 MIN.	DR. W. D. FALK	WAYNE STATE UNIVERSITY
EDUCATION: LITERATURE FOR CHILDREN	1	33 — 30 MIN.	DR. SHELTON ROOT, JR.	WAYNE STATE UNIVERSITY
HUMANITIES SURVEY	1	72 — 50 MIN.	DR. HENRY HERRMANN	WAYNE STATE UNIVERSITY

APPENDIX IV *continued*

INVENTORY OF RECORDED COURSES PRODUCED UNDER RELEASED TIME GRANTS

COURSE TITLE	NO. OF SEMESTERS	NO. OF LESSONS & LENGTH OF EACH	NAME OF PROFESSOR	INSTITUTION
GENERAL CHEMISTRY	1	61 — 45 MIN.	DR. JOHN H. SECRIST	WAYNE STATE UNIVERSITY
BIOLOGY: MAN & THE LIVING WORLD	2	60 — 30 MIN.	DR. GEORGE M. MOORE	UNIV. OF NEW HAMPSHIRE
BIOLOGICAL SCIENCE	2	100 — 30 MIN.	PROF. EDGAR EVANS	ST. PETERSBURG JR. COLLEGE
THE RELIGIONS OF MAN	1	50 — 30 MIN.	MRS. BETTY SMITH	ST. PETERSBURG JR. COLLEGE
GENERAL PSYCHOLOGY	2	96 — 45 MIN.	PROF. LEWIS GOLDBERG ET AL.	UNIVERSITY OF OREGON
GENERAL HYGIENE	1 QTR.	22 — 50 MIN.	DR. CARL L. ANDERSON	OREGON STATE COLLEGE
HUMANITIES	2	30 — 50 MIN.	PROF. JOHN WOODS	WESTERN MICHIGAN UNIV.
EFFECTIVE READING & STUDY	1	16 — 45 MIN.	DR. STANLEY E. DAVIS	UNIVERSITY OF HOUSTON
INTRODUCTORY ACCOUNTING	2	56 — 45 MIN.	DR. I. E. MCNEILL	UNIVERSITY OF HOUSTON
BASIC COLLEGE SPANISH	2	90 — 30 MIN.	MRS. MIRIAM AMOR	DADE COUNTY JR. COLLEGE
BASIC COLLEGE MATHEMATICS	1	45 — 30 MIN.	PROF. THOMAS CARTER	DADE COUNTY JR. COLLEGE
GENERAL CHEMISTRY	2	53 — 45 MIN.	DR. LEON O. MORGAN	UNIVERSITY OF TEXAS
HISTORY: THE GREAT PLAINS	1	39 — 30 MIN.	DR. WALTER P. WEBB	UNIVERSITY OF TEXAS
INTRODUCTION TO PSYCHOLOGY	1	28 — 45 MIN.	DR. FILLMORE H. SANFORD	UNIVERSITY OF TEXAS
INTRODUCTION TO THE VISUAL ARTS	1	40 — 45 MIN.	DR. DONALD L. WEISMANN	UNIVERSITY OF TEXAS
FOCUS ON GERMAN (FRESHMAN GERMAN)	2	45 — 45 MIN.	DR. LEROY R. SHAW	UNIVERSITY OF TEXAS
MAGAZINE & FEATURE WRITING	1	30 — 30 MIN.	PROF. JOHN PAUL JONES	UNIVERSITY OF FLORIDA
U. S. HISTORY TO 1877	1	43 — 29 MIN.	DR. JOHN K. MAHON	UNIVERSITY OF FLORIDA
JOURNALISM: SURVEY OF COMMUNICATIONS	1	30 — 30 MIN.	PROF. HORACE G. DAVIS, JR.	UNIVERSITY OF FLORIDA
BEGINNING CHEMISTRY	1	44 — 30 MIN.	DR. JOHN BAXTER	UNIVERSITY OF FLORIDA
HUMANITIES	2	90 — 29 MIN.	DR. DIDIER GRAEFFE	UNIVERSITY OF FLORIDA
BEGINNING FRENCH	2	90 — 29 MIN.	DR. THEODORE MUELLER	UNIVERSITY OF FLORIDA
SECOND YEAR FRENCH	1	45 — 29 MIN.	DR. THEODORE MUELLER	UNIVERSITY OF FLORIDA
HUMANITIES	2	62 — 60 MIN.	DR. H. G. ALEXANDER ET AL.	UNIVERSITY OF NEW MEXICO
INTRODUCTION TO GUIDANCE	1	3 DEMONSTRATIONS	DR. GEORGE KEPPEL	UNIVERSITY OF NEW MEXICO

APPENDIX V

QUOTATIONS FROM TELECOURSE PROFESSORS

The following quotations are excerpted from confidential questionnaires completed by professors in the Faculty Released Time Program:

HUMANITIES AND ARTS

Humanities:

". . . the basis of comparison should be between television lecturing and large-class lecturing, and not with the small-class or seminar type of situation. Intimate discussion is not very successful or even feasible for classes of more than fifty students. A large audience, broken into small groups watching a number of receivers has a better chance of 'getting' the material than does a large class in a large lecture hall."

"Teaching on television neither avoids nor invents the major problems of education.

"We still have no convincing theory of learning, though we have an overwhelming apparatus of teaching. Television instruction, programmed instruction and all kinds of experimental pedagogy require such a staggering amount of money and staff time that such programs are likely to become permanent parts of a curriculum before they are even slightly understood, before, in fact, the older methods are understood."

"Not a substitute for classroom teaching. TV works well in the humanities area. Students' interest is maintained, attention is concentrated. It must be combined, though, with face-to-face experience. . . ."

"It is evident to most authorities on the subject of television teaching that in any such program some arrangement must be made for the student to encounter a flesh-and-blood instructor for purposes of questioning and discussion. . . . In any case, offering mass education on the college level is likely to result in an ever-increasing process of depersonalization whether the medium employed is television or larger and larger sections of live lectures. I am inclined to think that, of the two alternatives, television teaching is to be preferred. . . .

"However efficient and cooperative the technical staff may be, the lecturer himself is forced to expend on technical problems much of the time which he should be devoting to scholarship. As a result, the intellectual substance of the lectures may be impoverished and the instructor himself may reach a point of scholarly stagnation. . . .

"Television teaching is able to accomplish wonders in visual and auditory enrichment of the course content; and, in the hands of a competent and intellectually honest instructor, it can do so without cheapening or vulgarizing the subject matter which it presents. It has the further merit of being

able to present a uniform subject matter to a relatively large body of students. The size of the student body so taught becomes incredible when the possibilities of videotape are fully explored."

"In a course where the aim is to evoke aesthetic response as well as convey content, drama, poetry, art, and music can be presented in a manner usually not possible when using ordinary means of classroom presentation."

English and American Literature:

"As a TV teacher, I think that TV is a good substitute for large classes but cannot replace the small, personal class with the give and take of intellectual ideas. But it is much better than lecturing to large groups: more intimate, easier to follow, better organized, and, once in a while, it can really communicate a mood or a concept as no other way could."

Literature:

"The instructor is enthusiastic about his experiences in the course. He is convinced that teaching literature by television is feasible, advisable, and, under certain conditions, preferable. He believes that this was his top performance in over 20 years of teaching this course, and he expects never to teach it so well again unless there is another opportunity to teach it by television.

"1. The measurable achievement of the students, so far as it can be evaluated, was apparently no better and no worse than that of non-television students.

"2. Much of the effect of a course in literature, probably the most important effect, is not measurable. It consists of inducing the student to build up a friendly feeling toward art, to develop standards of judgment of art, and to begin to acknowledge that all art, particularly literature, provides the best means we have of understanding and enjoying life and learning how to make the best decisions in the conduct of life. Any experienced teacher of literature develops a kind of sonar which enables him to sense his effect on his students—often a delayed effect that the student may not recognize for many years. The instructor believes that the television method helped him intensify this intangible impact on his students.

"3. Apparently this course was a successful experiment in adult education. [The station] sent out each term approximately 75 copies of the outline, plus other material, to home viewers not enrolled in the course. At least a small number of these tuned in for the whole year's work. Each term the instructor received several cards and letters from home viewers. It is his impression that literature is emphatically one of the college subjects that may be and should be presented to home viewers by means of television lectures. Since, unlike many other subjects, literature is potentially enjoyable by all people, the lecturer begins with a certain advantage. Therefore, the future of courses in literature in adult education by television ought to be immense.

"4. The instructor found himself coping with two restrictions peculiar to the teaching of literature on television.

"First, literature, being the most universal subject in the curriculum, deals with controversial questions in economics, politics, religion, and sexual conduct. Even in the ordinary classroom an instructor must try to avoid such open discussion in these areas as will unduly shock his students, though mild shock is often a salutary experience. But in television, because of the heterogeneous audience, the lecturer must avoid even mildly shocking his listeners. He must not discuss certain topics and he may not even assign a large proportion of great literature written in the twentieth century. These restrictions are apparently unavoidable but are most unfortunate. Teaching literature by television is thus a source of deception. The listeners are not given the whole truth about literature.

"Second, the copyright laws restrict the choice of what literature is to be discussed, and the use of audiovisual aids to discussion. Because of the newness of educational television, this is an area in which precedents are still to be established. The instructor in this course requested and obtained the right to broadcast certain copyright literature free but was refused other selections. . . . Until such time as broadcast rights for educational television are clearly defined, any lecturer who wishes to use examples of fairly recent literature suffers from restrictions that not only hamper and annoy him but also seriously impair the value of his course."

English:

"I found TV lecturing much more difficult than lecturing to a large live class. It is more nerve-racking and frustrating than live teaching, where one can be buoyed up after a successful presentation or by students' questions and interest. This is missing in television. . . .

"I believe in TV teaching and think that it will eventually overcome the opposition of reactionary teachers. I do not find students opposed to it, except the very poor students and the extremely bright ones."

Philosophy:

"The presentation of certain college courses on TV is indeed highly satisfactory, and perhaps even desirable; whether or not philosophy is a suitable subject is not so clear. The strictly conceptual character of much of philosophy does not lend itself to the visual techniques which are the contribution of TV to education. In fact so much depends upon the ability of the instructor in philosophy to project himself (in order to communicate his subject matter), that the success or failure of a given philosophy course on TV may hinge on this imponderable, the ability to project a convincing image."

"To put such a course on TV has not the special advantages of courses which depend on the showing of visual materials. Visual devices were shown with some profit, but they do not make the teaching more significantly effective than it would be in the classroom. The careful preparations required for a TV course make it possible to lay on a course which is more tightly constructed and which covers more ground than the same course in the classroom. This is not an unmitigated advantage, as students like the greater

informality of live teaching. I found, however, that the students absorbed the material well, that their interest was aroused, and that the final examinations came out neither worse nor better than usual. 'Idea' courses which are usually given to large classes might just as well be given on TV, provided that the instructor manages to overcome the considerable difficulties of recording his lectures effectively."

Religion:

"I am thoroughly convinced of the potential effectiveness of TV teaching. It provides for a far more personalized communication from teacher to student. It makes possible the concise, orderly presentation of facts and ideas without time-consuming discussion and argument."

Speech:

"Now that we are in the second year of presenting this course on television, the reaction of the students has been more favorable and certainly my own reaction is more favorable to teaching on television than ever before. . . ."

"Teaching on television can be (and for me, is) the most rewarding and challenging kind of teaching possible within the concept of education as we now know it. It requires a degree of rigorous self-discipline in preparation, organization and research seldom attempted by the average classroom teacher, and certainly never before approached by me. . . ."

"In my experience of teaching for two semesters over closed circuit television, I am convinced that the medium is effective in the classroom. The principal reason that I favor TV teaching is that the medium allows for remarkable flexibility of time and space in selection of content materials. For instance, in teaching a speech class over TV, I can turn back the clock twenty years to December 8, 1941, and move the audience to the joint session of Congress to listen to FDR's speech calling for a declaration of war. The scene is easily established by fading into a newsphoto made on that occasion, while playing an audio tape of the speech. Or it is possible to refer to the majestic language of Winston Churchill's 'Blood, toil, tears and sweat' speech, then to dissolve to a film clip depicting World War II scenes over which we hear Churchill's moving words. . . ."

Foreign Languages:

"The teaching of Spanish, if it is to be done by television, needs to be reinforced by a classroom teacher. The lectures and demonstrations on television could be given by a member of the senior staff who would be an experienced teacher. The graduate assistants could supervise the class while it watches the television presentation. They could also be used in the Language Laboratory and in discussion sections. Possibly under these circumstances, the television teaching could be much more effective than it is at present. . . ."

"I feel that television has taught me to organize myself, to know my subject and to be more outward and direct than I had ever been or would have been.

"On the other hand, the exclusion of students completely hampers the warm relationship which can exist. . . ."

PHYSICAL SCIENCES AND MATHEMATICS

Reasoning and Understanding in Science:

"Before the advent of television here, this course was taught in large lecture sections. Acoustics were poor in the room available, demonstrations were not effective and board work was difficult. On television, everyone hears well, demonstrations are easily seen and written work comes through clearly. . . . We have yet to lose a class due to technical problems.

"My favorable attitude is strengthened by the fact that the students are achieving higher grades with the course on television than they did when it was presented in the conventional fashion. . . ."

Chemistry:

"I am convinced of the inherent value of education by TV, if properly handled and judiciously used. . . .

"TV is, of course, a tremendous time-saver, allowing the instructor more time for other work and research; and this point alone overbalances, in my opinion, the limitations of the medium. It is especially advantageous for large classes where it is necessary to repeat the same lecture one or more times per day. The use of the same tape, rather than different lecturers for different sections, also makes for a better integrated course. I am not convinced, however, that TV adequately replaces the instructor before single, small, intimate classes. . . ."

"This statement is made after two and a half years' experience in teaching chemistry by television. I think it has great possibilities. I do not think we have made the maximum use of our techniques as yet.

"The fact that each student can have a front seat, as it were, is a decided advantage in presenting demonstrations. The use of demonstrations has practically disappeared from the classroom teaching procedures. Television has brought them back in.

"One of the real problems one faces is the problem of sufficient drill. This, of course, is a question of manpower.

"I am convinced that in the course of another year or two, we will be doing a much better job than we are doing now. I am also convinced that at the present time we are doing as good a job as we used to do by the regular classroom method."

Biology:

"TV recording has relieved me of a repetitious burden; has made possible certain presentations requiring arduous sustained effort which need not be repeated; has forced me to tighten my lecture technique leaving out almost all extraneous material; and assures that all the students taking my course

will get the same course. On the other side of the ledger, there are some things to be said. I am extremely dubious whether the personal contact that is so important in the teaching process is maintained even with large screen close-ups. . . . Many times I have attended large public lectures to see a Nobel laureate in the flesh or have stood on street curbs (in the rain) to see a famous statesman pass, although I would not have watched either on TV. . . ."

"For the Biology Department of_____University, the use of television in its basic course has solved many perplexing problems. We are able to accommodate the great number of students without sacrificing our upper-class undergraduates and our graduate programs . . ."

"I feel in the position, at this time, of being qualified as a consultant to beginners in TV teaching. There are many things which I have learned by experience (some fairly bitter) that I think should be included in a course of instruction for neophyte TV teachers, such as—

I. Do not let the director dictate the material to be taught. He may say that a segment of the course is not televiseable, and hence should be omitted. If you are a teacher of some years experience, use your own judgment of your efforts and if a thing seems good to you by all means use it. This is especially true if some means of recording a lesson is available. Try to view some tapes after they have 'gotten cold' and learn what you can from them. Every teacher that I know who has done this is a better teacher for it.

II. If you are badly dissatisfied with your work on a certain tape, refuse to release it and insist that it be retaped. You alone will be judged by what is seen on the screen.

III. Be sure that your course does not enter the class of a monitor teacher hostile to your viewpoint or to TV. This sets the whole TV program back.

IV. Do not be dismayed by the lack of student-teacher contact. Many students have told me that they prefer the uninterrupted lecture to classroom discussion.

V. Remember that a bad visual is worse than none at all. Do not let your director tell you that your lesson is too much talk and not enough visuals, that it might as well be radio. This is to discount the visual aspect of a person's personality which may be considerable.

VI. Insist on speaking at your normal rate for lecturing.

VII. If your voice doesn't please you, consult an expert in this field and ignore the advice of others."

Mathematics:

"It is my belief that no device can supplant the capable classroom teacher entirely, but further study, work, and experience will show ETV to be one of the most valuable tools used in modern education. . . ."

"I believe that television is a reasonably effective way of teaching mathematics. Certainly, the grades of students taking this particular course by television were not lower than those of students in previous years taught by conventional methods. Television has another advantage in that all students in a course follow exactly the same syllabus and thus are similarly prepared for subsequent courses.

"The major drawback in television teaching, in my opinion, is that the instructor has no immediate method of gauging student reaction to his presentation. . . ."

"In mathematics, all other things being equal, teaching on television cannot rival live teaching. Television does not offer to mathematics the peculiar advantages that it might offer to the sciences, dramatics, music, etc. Nevertheless, when all other things are not equal there may be good reason to teach mathematics on television. . . ."

SOCIAL SCIENCES

General Social Science:

"I am very enthusiastic about the use of television for academic instructors. I believe that we are only beginning to understand its potential as a teaching technique. I feel that in the long run television will permit up-grading the mass teaching function in our society."

Social Science:

"I think it is a worthwhile experience, the challenge of lecturing to an unseen and unknown audience . . . my conceptual formulation has tightened up, and the quality of the professional level of my discourse has improved.

"However, the artificiality of the situation is disturbing to me. I miss the spontaneous interchange with the student and the 'feedback' of the audience response. . . ."

Sociology:

"The greatest advantage . . . seems to reside in the unique possibilities of illustrating and dramatizing concepts, ideas and processes with the help of photos, slides, filmclips, movies and records . . . an advantage that the conventional classroom instructor can hardly approximate."

Psychology:

"A psychologist can present to his students in a course on television many experiences which he cannot give them otherwise. He can plan skits dramatizing the dynamics of behavior; he can plan a mock counseling interview; he can allow them to observe closely the behavior of animals in experimental situations and children in test situations. He can supplement the lecture with

well selected candid photographs and film strips bringing greater realism to a college lecture than has been achieved before. In addition, he can deal with the minute aspects of graphs and tables, and bring prestige and interest to materials in a text book toward which a student often has resistance. He can plan interviews with people who will help him illustrate the phenomena of personality. . . ."

Psychology: Effective Reading and Study—

". . . the advantages outweigh the disadvantages."

Economics:

"I have been most impressed, perhaps, with how new television really is and how much had to be learned by brute experimentation on one's own. . . . My second general impression has been the rather staggering requirements which were imposed on the instructor's time. . . ."

International Relations:

". . . I found myself forced to prepare my lectures much more carefully and to organize my material more carefully . . . news-clips, pictures, place names, personal names, dates, etc., in short the great wealth of visual material, proved most helpful in teaching this course. . . . I feel that the advantages of TV teaching outweigh the disadvantages."

American Government:

"Television teaching has been, and I'm sure will continue to be, an exciting, challenging, and, for the most part, a satisfying experience.

"Most comments received from the students indicate that they prefer television teaching to the regular classroom approach. They appear to particularly like the well-prepared lectures and the use of audio-visual aids which can be used with greatest impact over TV. They do not appear to be bothered by the impersonal relationship with the television screen; in fact for the most part they seem to watch it more carefully and feel more personally involved in the lectures than when a live professor stands in front of the class. . . ."

Development of Western Civilization:

"To me the greatest contribution of TV teaching is that it forces an upgrading of teaching in general. . . .

"My experience as a TV lecturer has convinced me that I can teach the subject more effectively for large numbers of students. However, it should be noted that for some few this is not true. . . .

". . . I miss greatly the personal contact with students and the give and take of the well conducted small class. But when I ask myself, 'If you had to make a choice between TV teaching and teaching small classes, which would you like?' I unhesitatingly choose the former."

American History:

"I have found TV teaching to be as effective as regular classroom instruction. . . . A TV presentation can have the highly beneficial results of standardizing the course. . . .

"The two major student objections to TV instruction seem to have been that it is too rapid and that there is no opportunity to ask questions. To meet the first objection, I have prepared a student manual which follows the tapes and gives about 60% of the material. There could be opposition to such a manual on the grounds that it eliminates note-taking; however, it may be that note-taking is not essential to the course. The classroom teacher, having the lectures out of the way, could devote his time to other methods of teaching the course. As for the second objection, I find it unimportant, since students seldom interrupt a lecture with questions, and any necessary questions can be asked at the third, non-TV meeting of the class.

"The history course has been suited to TV presentation especially in the use of maps; it is much easier for the class to study an outline map especially made for the TV screen than it is for a group to study the usual cluttered map that is used in most classrooms. . . ."

". . . I found television to be excellent as a medium for teaching. It has limitations, of course, as has any medium, including the classroom. On the other hand, television offers a fine, easily controlled and commanded combination of audio and visual elements beyond all classroom possibilities. . . .

"The major drawback I found was the amount of time consumed . . ."

EDUCATION

Elementary School Education:

"One of the primary ingredients for a provocative teaching situation is motivation, that is the need for the teacher to continually stimulate students to be vitally concerned with subject areas under consideration. Only in this manner is he able to fully absorb a teacher's purpose for his use in further study, interpretation, and drawing conclusions. Teaching by television has provided this motivation factor for me in that the theory of elementary school education has become alive to college students since our use of TV."

Foundations of American Education:

"Television is effective! Sometimes tests used in the regular classrooms were given. The results were the same. . . ."

The Teaching of Arithmetic:

"Frequent criticism is made of television instruction to the point that it is impersonal, detached, and makes impossible student-faculty identification. *This need not be true.* . . .

"We found it necessary to remake all tests. Those used previously were *so easy* that there was almost no range between high and low scores. On one

test only a 20-point difference existed between the top and bottom scores of television students, when formerly this test was adequate to discriminate in a 35-40 point range. . . ."

American Public Education:

"For me, teaching by means of television had some obvious advantages. One was that I forced myself to take a good hard look at course content. . . . The topics were reorganized, with emphasis given to stressing basic ideas.

"Secondly, by means of television, I can go into the lecture rooms and sit, almost detached, concentrating on student reactions to their viewing. . . ."

Literature for Children:

". . . Televised courses are a good compromise when highly effective instructional staff cannot be obtained for all students who would take the course 'live'. . . . The use of interviews with author and editors (four in number) added immeasurably to the strength of the course. Three other interview tapes with members of my own faculty also made available to students talents which would not have otherwise been obtained. . . ."

Science for Elementary Teachers:

". . . Teaching on television is rewarding for the teacher and is certain to have a place in education in the future. It would be well if we gave more thought to the training of television teachers."

MISCELLANEOUS

Agriculture in the Economy:

"I miss the stimulation of student reaction to the presentation underway. Also, at first, the studio paraphernalia were somewhat distracting. Both of these reactions have tended to wear off with the passage of time.

"I feel that for a class this size, TV presentation is better. In a class of 300, someone is always in the process of coughing, shifting feet, snapping note books, etc.; so there is a continual background of distraction which cannot completely be eliminated. In the small TV viewing groups this is less of a problem.

"The students also seem to feel more comfortable in the smaller groups. Surprisingly, they also seem to feel a closer personal contact with the instructor than in the very large class. . . ."

Principles of Economics Applied to Agriculture:

"My opinion of teaching on TV can best be given as advantages and disadvantages.

Advantages:

1. Allows visualization in a way not allowed by other means.

2. One teacher can teach many students in small groups and therefore each student can be close to visuals and to the teacher. This tends to reduce distractions in the classrooms.
3. Once the lectures have been taped, the Instructor is free to teach other courses or carry on other duties.
4. Can have organized, uninterrupted presentations.

Disadvantages:

1. Lack of stimulation to the teachers from classroom response."

Accounting:

"Rewards for the teacher are different on television. Gone is the reward of seeing faces light up with understanding during the lecture. Gone, also, is the challenge of awakening individual minds by pointed emphasis or personal reference within the lecture. Gone is the sense of appreciation gathered from students in the classroom. Instead of these, the television teacher has a feeling of professional accomplishment, a sense of achievement in lecturing better without the aid and invigoration of student response, of providing a personal academic challenge through a very impersonal medium. (To appreciate this reward, the television teacher probably must have a greater serving of 'ham' in his personality!)

"The greatest value can be accomplished in television teaching by recording lectures on videotape. This allows the development of better materials and the production of better lectures. It also frees the teacher then for personal work with students, giving back to him the traditional personal rewards of the professor in addition to the professional rewards of television teacher. . . ."

THE TEACHING OF ECONOMICS VIA TELEVISION AT THE COLLEGE LEVEL

by

DONALD W. PADEN
Professor of Economics, University of Illinois

IN THE COURSE of the next decade more and more college teachers are going to be exposed to television as a vehicle for instruction. The purpose of the present discussion is two-fold: first, to describe a specific course in principles of economics which has been offered by television for the past several years and, second, to indicate in more general terms some of the alternative uses to which television can be put, some of the advantages and disadvantages connected with television and some of the techniques available to those contemplating the practical use of television. A number of broader issues connected with instructional television will be ignored or mentioned only in passing as, for example, the question of special remuneration for television instructors, the rights of instructors in the re-use of videotapes, the possible influence of pressure groups upon what becomes (with the use of television) almost "public" instruction, and so on.

Television as a means of mass communication for instructional purposes is a relatively new development with revolutionary implications for instruction at all levels. What makes television interesting in the present decade is the juxtaposition in time of a technological innovation of major significance with a potential doubling of the student population enrolled in elementary college courses and an inelastic supply of highly qualified college instructors. Television promises to be a means of reaching students who otherwise might receive no instruction at all, or, at best, instruction which fails to measure up to present standards.

Television is thus a device for economizing on the use of manpower and, in the lingo of the economist, of increasing the productivity of the best teachers. Under favorable conditions, more students can be taught per hour of instructional input via television than is possible with conventional instruction. From the standpoint of the instructor in a large university, television should be regarded as a means of taking some of the drudgery out of undergraduate economics courses. Beginning courses in these institutions tend to be mass-produced even under favorable circumstances. In the small college, where the instructor is typically burdened with a heavy teaching load involving many courses,

television may make the dual responsibility for teaching and research less difficult—the use of "canned" instruction in some areas may make it possible for the instructor to specialize in others. Wisely used, television may make it possible to re-deploy teaching talent to areas where it can be used more effectively than in the classroom: for conferences, discussions, criticism of written work, etc. Happily, such a revolution in the teaching profession is possible at the present time without the danger of unemployment because of the large expected increases in enrollment.

In the long run, the significance of television may lie largely in its effectiveness as a visual aid and in its broader application as a teaching machine. Visual aids in the college classroom have a long and honorable record—witness the blackboard! It is not unreasonable to assume that television may soon make it possible for students to acquire more information and to manipulate it more skillfully in a shorter period of time and with the expenditure of less effort on the part of both students and teachers than is possible in the present-day classroom. Needless to say, this day has not yet arrived. Through television, however, the primarily aural perceptions of today's lecture hall will be greatly heightened by a new and extraordinarily versatile element of visual perception, which most of us find so effective in our solitary reading.

THE TELEVISION PRESENTATION OF PRINCIPLES OF ECONOMICS

For the past three years at the University of Illinois part of the instructional input of a course in principles of economics has been derived from television lectures. The project was financed in part by a grant from the Ford Foundation and in part from funds provided by the Office of Instructional Television at the University of Illinois. Although the course is still in its developmental stage, the experience has been sufficient to enable one to form a fairly good opinion as to the over-all effectiveness of television as an aid in teaching the principles course. Needless to say, a great deal has yet to be learned about the relative effectiveness of various types of presentation, the best use of the discussion period, the proper kinds and amount of outside reading material, the best uses of devices for eliciting student involvement, the most effective testing programs, and so on.

The course under consideration is a three-hour, one-semester course in the Principles of Economics for non-commerce students. It is largely a service course for students in liberal arts and science, engineering, agriculture, etc., and involves approximately 1,300 students per year. Roughly one-third of this group has been taught by television. The non-

TV students are handled in discussion sections of about 30 students each and are taught by full-time staff members. A common text-book is used in all sections, assignments are more or less standardized and the same objective type final examination is given to all those taking the course. For most students, it is a terminal course taken in their sophomore or junior year.

During the first two years of the experiment, the television cl sses were taught using three 30-minute television lectures, each followed by a 20-minute discussion period. Graduate teaching assistants conducted the discussion sessions. Several aspects of the arrangement became increasingly unsatisfactory. First, the discontinuity of instruction within each hour was time-consuming and somewhat awkward for the teaching assistants conducting the quiz sections. Second, the 20-minute discussion period frequently did not allow sufficient time for the development of points which arose in the discussion period or which needed to be elaborated as a supplement to the formal lectures. Third, the use of graduate teaching assistants as proctors for the 30-minute television lecture was uneconomical. For the past year the same material has been covered in two 50-minute television lectures per week, with one 50-minute discussion session, again conducted by teaching assistants.

Unfortunately, it was not feasible to assign students to the TV and non-TV groups on a random basis, so that for purposes of statistical analysis one needs to assume that what happened during registration was equivalent to randomization. In at least one semester, however, the abilities of the two groups as measured by a short vocabulary test were not equal (see Table 1). Other unknown differences between the TV and non-TV group may also have been present.

TABLE 1

OBJECTIVE TEST SCORES FOR STUDENTS
RECEIVING TELEVISION AND CONVENTIONAL INSTRUCTION

	VOCAB-ULARY	FINAL EXAMINATION TEST A	FINAL EXAMINATION TEST B
TELEVISION	51.8	32.9	23.8
NON-TV	53.1	34.9	23.3

With these reservations in mind, the statistics in Table 1 are presented as being reasonably representative of results obtained during the first two years of the experiment. The vocabulary test is self-explana-

tory. Test A was an examination covering in as much detail as possible the material specifically covered in the course. Test B was a very general economics comprehension test given at the first of the semester and repeated as part of the final examination. Both Test A and Test B were objective examinations and should be interpreted with all of the reservations inherent in such examinations.

The differences in the average scores of the two groups after attempting to allow for the initial differences in ability (as measured by the vocabulary test) were not statistically significant. This was true also for other semesters. Perhaps the most reasonable interpretation of the figures in Table 1 is that by and large students who were exposed to a combination TV lecture and discussion session conducted by teaching assistants did about as well on several objective type examinations as students who were taught in small sections by full-time staff members. This has been true for several semesters, with average scores sometimes favoring television, sometimes favoring conventional instruction. Generalizations based on this limited experience as to the effectiveness of television are perhaps unwarranted, although it should be pointed out that for other courses in other institutions these same results seem to be the rule. During the past year when 50-minute programs were used, the TV group did less well on comparable examinations. Differences in content were more pronounced, however, and no statistical controls were used during this period to insure even rough comparability between groups.

The reader should also bear in mind that a really convincing demonstration of the effectiveness of television for instructional purposes is a difficult assignment. One sample design, for example, would involve two groups of students randomly assigned to the two methods, exposed to the same instructor, taught at the same hour of the day and covering the same subject matter, one group being taught by television and the other group by more conventional methods. Even so, a difference in the instructional skill in the two situations (or bias for or against one of the two methods of instruction) might significantly influence the outcome. Assuming two such groups of students could be made available, should television play the role of a peeping tom with little opportunity for the exploitation of the great advantages of television or should all the visual aids which can be brought to bear be used with the television group? Or, conversely, should the "live" lecturer use all or as many of the TV visual aids as possible—even though it is unlikely that these would ever have been developed in the absence of television? This suggests some of the problems without, unfortunately, providing answers.

THE PROS AND CONS OF INSTRUCTIONAL TELEVISION

In the minds of most people, the primary advantage of instructional television is its ability to provide instruction for large numbers of students. Television, in conjunction with videotape, is seen as a replicative device par excellence. For the decade ahead, it may indeed be true that television is the only practical way of providing educational opportunities for the suddenly swollen population of college age students of the 1960's—assuming that teachers cannot be trained rapidly enough to man the necessary classrooms. Regardless of the soundness of this view, it is instructive to look at the general problems posed here not in physical but in economic terms. Assuming that staffing problems of the next decade can be solved either by conventional methods or by conventional methods supplemented extensively by instructional television, which of the two alternatives is likely to be the least costly? From the standpoint of the economics of the situation, is the promise of television real or imagined?

Although figures on the comparative costs for different types of instruction are given in the last section of this paper, it seems appropriate here to list the major conclusions which seem to follow from the data. First, television instruction offers substantial saving over small classes taught either by faculty or teaching assistants if the number of students exceeds two or three hundred. Second, television is cheaper than large lectures only if live lectures need to be repeated and if a substantial number of the television programs can be repeated several times before they are re-done. Finally, elaborate television productions for instructional use seem likely to be economical only if used by several institutions. Unfortunately, the most revolutionary aspects of television lie in such programs, although surprisingly little is known about their effectiveness or their appeal to small colleges and universities. Thus, from the standpoint of the economics of the situation, television appears to be an instrument for mass education only under certain restricted conditions. In many cases justification for its use must rest on non-economic grounds where it can be demonstrated that it is possible to do a better job of teaching with television than by more conventional methods.

A second advantage of educational television has to do with expected improvements in the quality of the instructional input. What can safely be said is that the television instructor is very likely to be superior to his run-of-the-mill classroom counterpart. Although it is sometimes alleged that the very best talent available is likely to be used on television, until

more adequate arrangements can be worked out as compensation for the disadvantages inherent in teaching by television (through a combination of salary differentials, royalty rights, teaching loads, auxiliary services provided the television teacher, etc.), this contention must be regarded as a somewhat questionable hypothesis. Typically, the very best lecturers and teachers have things too good as it is to be strongly motivated in the exploration of new frontiers.

Third, real gains are likely to be realized from improvements in course content, organization, presentation, etc. The importance of videotape as an instrument for improving the quality of instruction can hardly be over-emphasized. The purpose of each lecture can be specified in advance, material can be prepared and criticized by one's colleagues, the videotape can be reviewed, edited, sections re-made, and finally the videotape can be used in the classroom and evaluated. Since videotape relieves the instructor of going through the entire series of lectures each semester, by successively concentrating on small segments of the course, the over-all quality of the presentation can be systematically improved. In a sense the use of videotape offers the teaching profession for the first time in the history of teaching a practical opportunity for actually accumulating capital in teaching. Certainly the economist is the last who needs to be reminded of the effectiveness of roundabout production. Almost as important is the possibility of mass-producing videotapes so that programs can be widely disseminated on an economical basis. Under these circumstances it may become possible to offer large enough monetary rewards to outstanding teachers to interest them in teaching by television and to support the other production costs involved in elaborate programs. Even for the seasoned instructor, videotaped instruction is an extremely powerful teacher-training device and a very ruthless teacher-disciplining mechanism.

Finally, there are certain technical advantages inherent in television. In economics, these reside largely in the increased effectiveness of visual aids—charts, tables, etc.—together with the possibility of presenting guest lecturers of one kind or another. In other subject areas the increased use of demonstrations are undoubtedly even more important, as in dentistry, physical education, medicine, microscopy, teacher training, etc.

Turning to the other side of the picture, there are at least three important disadvantages to television. First, educational television is apt to absorb a disproportionate amount of the instructor's time. In an institutional environment where monetary rewards and academic standing depend to a large degree upon research and publication, the long-run

position of the instructor may be seriously undermined by any intensive and prolonged involvement with instructional television. Such an observation must be qualified by considerations of subject-matter, the skill and versatility of the instructor, the type of instruction which is being offered, and so on. This disadvantage is least with simple, closed-circuit, unrecorded instruction and greatest with more elaborate programs. Unfortunately, it is with the more complicated type of instruction that the gains from educational television are apt to be greatest.

Second, teaching via television involves different skills and different satisfactions and rewards than classroom teaching. Ordinarily, the college teacher is an actor whose chief stock in trade is a knowledge of subject matter which approaches the definitive. This is supplemented in the classroom or in the lecture hall by imagination, by speaking ability, by ability to organize materials, by perception of audience understanding, and by many other characteristics too numerous to mention. Demands upon the television instructor with respect to these secondary characteristics are greater than similar demands upon most other instructors, are unlikely to be acquired spontaneously, and are difficult to come by late in life. While the fundamental role of the teacher remains the same—to impart facts and relationships to students so that they can be understood, to contain ignorance within recognizable boundaries, to impart insight into and tools with which to penetrate the unknown—the function of the teacher in this process changes with the method of instruction and the technical facilities at his disposal. The satisfactions derived from teaching are also radically altered—close personal relationship between teacher and student is unlikely, the exhilarating experience in the interaction of teacher and student is no more, communication is disrupted, the mutual generation of ideas is impossible, spontaneity is difficult, and so on. Satisfaction instead must take the form of a knowledge that the teaching task has been well done and perhaps that it has reached sudents who, except for television, might otherwise never have been reached at all.

Third, there is the danger, real or imagined, that the instructor will be unduly restrained by pressure groups from discussing controversial issues. Or, more subtly, by reason of the fact that instruction is now more "public" than before, the instructor will be inhibited in the expression of opinions which are "unpopular." This tends to be more serious in economics than in many disciplines because of the wide discrepancy between economic reality and our economic folk-lore and because of the existence of very powerful groups in our society in whose interests it is to have misleading folk-lore perpetuated. Unfortunately,

the extent of such influences is likely to increase as the size of the audience increases.

TEACHING BY TELEVISION

Let us turn now to a more general discussion of instructional television as seen from the viewpoint of the teacher. The potentialities, the limitations and the problems of instructional television are seldom obvious to the uninitiated, especially since so much of what is actually seen currently as "instructional television" is very little more than the usual classroom lecture monitored by a television camera. Thus, only very modest attempts are ordinarily made to exploit the possibilities of television as a teaching device, largely, I suspect, because to do so requires very considerable effort and some risks—in spite of the instructor's best efforts the end product may not be particularly successful. While the general thesis of what follows is going to be that for instructional television to compete successfully with the ordinary classroom requires breaking away from established habits and developing new techniques, in some respects the real problem is more simple than this: the number of man-hours of input per hour of instructional output is apt to be far greater with television than with conventional instruction.

As a safeguard, it is undoubtedly wise to start with the obvious observation that successful instructional television depends primarily upon the teacher. The television screen can only mirror what the camera sees and it is almost inevitable that the student will see and hear a good deal of the instructor. The teacher, however, is not the whole story. Skillfully used cameras are in themselves powerful tools and, when coupled with the imaginative use of other equipment typically available to the television teacher, provide unique opportunities for communication between instructor and student.

The first and perhaps most lasting impression which television is apt to leave with the instructor is the very limited amount of information which is capable of being shown on the television screen at any given moment. This is particularly true in a course such as economics where graphic and numerical analysis are prominent features of instruction. Accustomed to roaming across the very considerable reaches of the blackboard, the instructor now finds himself confined at any one instant of time to an effective viewing area of less than 2½ x 3 feet—room enough for only the simplest chart or most elementary table.

What can be done to make this limitation less inhibiting than might be supposed at first thought? First, assuming there are two cameras, one

camera can be used to show the instructor (possibly together with the chart) while the second camera can be used to focus on details in the chart. The effect is one of magnification and, after some rehearsal, can be easily and instantly accomplished. Although magnification proper is perhaps more generally useful in the physical and biological sciences than in such courses as economics, history and political science, nonetheless when used with charts and tables the end result is most effective. A set of figures barely visible in a large lecture hall, even with conventional instruction, can be made as large as needed on the television screen.

Second, the small size of the viewing area can be compensated for in part by building into charts and tables resolution characteristics which enable the viewer to see more than might be thought possible. By the skillful use of shading, by the use of pre-printed letters, by contrasting grids and in general by making illustrations exceptionally crisp and clear, the amount of useful information can be raised to levels acceptable for even rather complicated material.

Third, by building up illustrative material over a series of lectures progressively more and more information can be put on the screen without its becoming unintelligible to the viewer. Dotted lines, shading, scales, standardized abbreviations, etc., when consistently used, function as referents so that elements of charts and tables assume specific meaning without visual proliferation.

Fourth, the skillful use of cameras and projection equipment makes possible a feeling of motion which compensates for the momentary limitation of the TV screen. For example, the camera can scan a chart of the business cycle covering the past 150 years with no more than 10 years of the chart showing on the screen at any one time. The effectiveness of the result is difficult to achieve in the conventional classroom. Indeed, the instructor can be superimposed over the chart while particular periods are discussed or the instructor can be shown separately anywhere on the screen with the chart on the remainder of the screen. The "tricks" of the ingenious television technician are almost limitless.

In our own work a simple sort of animation has been made possible by the development of a technique for projecting 35 mm. slides on a rear view screen so that successive pictures are dissolved and replaced by others at the will of the lecturer. Diagrams can be built up element by element (without apparently disturbing what is already on the screen). Labels, lines, points, figures, etc. appear and disappear almost by magic and at a cost which is not prohibitive. Information in the form of charts and tables can also be "stored" and recalled during the lecture more effectively than can be done in the lecture hall with ordinary

blackboard facilities. (All this is accomplished, of course, at a rather high price in terms of time and money.) Finally, there is the possibility of incorporating into the videotape itself movies from film libraries or from film especially prepared for the television lecture.

A second impression which an encounter with television is apt to leave with the lecturer is that things seem to go more rapidly than with conventional instruction. Perhaps the additional time spent in lecture preparations results in the elimination of superfluous remarks. Certainly the preparation of charts and tables in advance means that less time is taken in their presentation. Students in absentia also seem more impatient and more eager to get on than students in person. The instructor can either present more material per class period or build into the lecture a certain amount of redundancy. Pedagogically, there is much to be said for repetition. Frequently, however, it is possible to do both. The problem, of course, is to do so without losing the students along the way.

For the course under discussion, a detailed lesson outline is prepared for each lecture for the student to follow as he watches the lecture. Topic headings, tables, charts, sometimes difficult notes, are reproduced *in toto*. The purpose is to relieve the student of an impossible job of note-taking and to free his mind for more constructive occupations. At best, the study of economics tends to involve extended and closely reasoned arguments; explanations are sometimes extremely involved and difficult to comprehend at first encounter. One of the functions of the lecturer is to lead the student through this maze of concepts and relationships the first time with the hope that the student will be able to duplicate the feat on his own and, still hopefully, that he will be encouraged to explore other relationships by himself outside of class, or in formal discussion groups or in other classes.

On the premise that learning is importantly related to doing, a good deal of emphasis is currently being devoted in the television lectures to involving the student in the lecture itself. Rather than become mere passive viewers, students are required to complete examples, finish analyses, work problems, draw diagrams, etc. Thus, an attempt is being made to replace note-taking with something designed to stimulate the student's thought processes and prevent him from becoming simply a receptacle for pre-digested information.

It is hoped in the near future that equipment will be available through which students can indicate electrically responses on objective type questions while watching TV. Equipment is currently available which will record and summarize student responses on multiple choice

and similar questions and which will indicate to the student immediately whether his response is correct. Moreover, if the first response is not correct, the student may "search" for the correct answer until it is found. Facilities of this sort should enormously increase the instructor's awareness of student comprehension, recall and analytical ability and provide an immediate feedback for use in revising lectures, demonstrations, etc. In a sense, the student is pitting himself against the machine for his own benefit, at least if his final grade is determined by written examinations. Obviously, such facilities could be used not only as a means of increasing student participation during the lecture but also as a device for giving more formal objective tests.

We are also experimenting with a page or two of written material which the student is asked to read before the television lecture. Definitions, background information, etc. are given to the student to provide a more or less common starting point and to relieve the lecturer of needless detailed explanations. The material is used to give students specific information necessary for the full understanding or appreciation of the lecture. Frequently, a one-page postscript to the lesson is also provided to round out what has been said in the lecture—to spell out qualifications, or to indicate directions for further explorations. How effective these various devices are in stimulating student thought, participation, and involvement remains to be seen.

A third impression which an encounter with instructional television is apt to leave with the instructor is the extraordinary demands made upon his time. Although the reason for this may already be apparent, some elaboration may be enlightening.

Perhaps it should be pointed out first that where the television camera merely monitors a regularly scheduled lecture there may be virtually no additional preparation required. From the standpoint of initiating the instructor into instructional television, such a situation has obvious advantages—the most important, of course, is the fact that there is a live audience to which to speak. In addition to this, however, is the fact that the instructor is in familiar surroundings, unencumbered by unfamiliar equipment, with chalk, blackboard, lectern, etc. close at hand, with the camera placed unobtrusively in the back of the room. Even from the standpoint of the student watching a rebroadcast of such lectures on television, there may be an advantage in his knowing that he is watching a class and not something which is supposed to be a performance. The student probably expects less and receives in return a certain amount of spontaneity which is difficult for most instructors to generate outside of the classroom situation.

As the instructor attempts to exploit television as a medium of communication, however, preparation time mounts apace. The decision to prepare videotapes outside the classroom probably presumes the use of more specialized equipment, props, visual aids, etc. than can be managed in the ordinary classroom. Under these circumstances, a minimum of one hour of rehearsal is probably required for each hour of lecture. Cameramen, floor managers, engineers, to say nothing of the instructor, need to be briefed by the director. The lecture may first be "walked through" quite rapidly to allow everyone to become acquainted with the content and main flow of ideas in the lecture and this is likely to be followed by a full-dress rehearsal.

Even a minimum awareness of what can be accomplished with visual aids and the ease with which they can be handled on television soon leads to the use of more elaborate charts and diagrams than is typical of the usual classroom. In our own case, charts and tables were soon put on 35 mm. slides for ease in presentation and storage. Their preparation, however, is time consuming. In order to complete rough sketches, to make and check final charts, to allow for photographing, developing and mounting the slides, each lecture had to be planned roughly three weeks in advance of taping. Although the elapsed time involved is obviously a function of both the number of people working on the project and the amount of work to be done, the transmission of information, drafting, photographing, developing, mounting, reviewing, etc. cannot be telescoped indefinitely. Our own program averaged perhaps 25 slides per fifty-minute lecture. Ordinarily, a two-hour conference with the director was required after rough drafts had been prepared in order to check on the feasibility of the ideas and to indicate to him the sequence of ideas to be presented. An additional two or three hours were usually needed to integrate the slides into the lecture, so that the lecturer knew what was coming up next. Editing, revision, and correction were occasionally necessary even at the last minute.

One of the very significant advantages of using a studio and putting lectures on videotape is that they can be previewed before showing them to students. For the instructor, this involves the investment of at least another hour of time. At this point, concern for quality may suggest that the lecture be done in segments so that a given segment can be re-done with greater ease. Any given segment which is re-done is apt to take the best part of an hour, even assuming that it can be re-done immediately.

Finally, if lectures are to be watched with teaching assistants for training purposes (before they go into the classroom to discuss the material with students), another hour or two may be spent at this point. All

of these things, of course, are highly desirable and illustrate how television can be used to raise the level of classroom instruction. The point is, however, that is achieved by investing time in instruction.

By way of summary, a simple list of the tasks involved in preparing a videotaped lecture for classroom use is instructive:

Organization of lecture
Rough draft of visuals
Conference with director, draftsmen, etc.
Preparation of outlines and writing of comments
Checking and editing slides
Integration of slides with lecture
Rehearsal with camera
Videotaping program
Review of videotape
Revision of videotape
Conference with teaching assistants
Evaluation

Even if each task takes on the average only one hour, the amount of time involved is impressive—and it is obvious that this is likely to be an understatement.

COMPARATIVE COSTS OF DIFFERENT TYPES OF INSTRUCTION

The difficulties involved in estimating the cost of instructional television arise from two separate sets of circumstances. First, on the technical side, the actual cost of equipment varies considerably depending upon how it is used and the quality desired in the end product. For example, a videotape recorder for a closed circuit system may cost $20,000, while for broadcast purposes the cost may be double this amount. Even for a closed circuit system, possible variation in the cost of cameras, lenses, auxiliary equipment, studios, etc. is large. Second, in its practical application, instructional television must be viewed as a complex operation with wide variation in cost depending upon how it is employed. The more important of the variables involved seem to be (1) the scale of assistance used in supporting instructional programs (art work, photography, etc.), (2) the location used for televising the presentation (studio, classroom, lecture hall, etc.), (3) the use of "live" vs. videotaped television instruction, (4) the amount of instructional input per program, i.e., the proportion of the instructor's time devoted to television and the number of programs prepared per week or per year, (5) the proportion of programs which are re-made each semester or each year, (6) the number of students viewing the program and the

organization of the viewing situation, i.e., the number of times the program needs to be repeated per day or per year, and (7) the salary scale of the television teacher.

The alternatives which have just been listed make obvious the almost innumerable ways in which programs for instructional television can be produced, with each alternative implying something different about costs. Moreover, any given production center is quite likely to be producing programs under a wide variety of circumstances and, in addition, may be producing programs of a non-instructional nature. Thus, any estimate of the cost of programs produced for instructional purposes is inevitably going to be the end result of innumerable arbitrary judgments both with respect to the type of equipment purchased and, more importantly, with respect to the circumstances under which the programs are produced and used. The matter is further complicated by situations where it can be demonstrated that television reduces cost in peripheral areas. Dormitory lounges, for example, may be equipped with television receivers, thus economizing on classroom space. In one actual case, instructional television made it possible to eliminate a large engineering laboratory with a good deal of expensive machinery and in the process to release space for classroom use. Or television may be used in teacher training programs so that student observation becomes less expensive and perhaps more effective. And so on. A simple comparison of the cost of conventional classroom teaching with the cost of very similar television instruction, therefore, must be regarded as a first approximation and perhaps not a very good one at that.

In approaching the problem of making such a comparison, several cost estimates were made for a number of fairly well-defined situations allowing the variables to vary over what seemed to be a reasonably wide range of possibilities. This was facilitated by dividing costs into six categories within which estimates could be made for appropriate variation of the circumstances suggested above. These general categories are listed below.

Recording costs—studio, videotape recorder, engineer, etc.
Instructional costs—instructor's salary
Supporting costs—director, art work, slides, etc.
Playback costs—videotape recorder, engineer, etc.
Tape costs—depreciation on videotape
Classroom costs—television sets, maintenance, etc.

Each of these categories is discussed below together with estimates of cost presented in table form. With respect to the first of these categories, recording costs, three distinct sets of circumstances are examined (see Table 2). The first is designated "Television Lecture" to indicate in-

TABLE 2

RECORDING COSTS—VIDEOTAPE

(Original Cost and Yearly Charges)

	ORIGINAL COST	DEPR.	CLOSED CIRCUIT TV LECTURE (MINIMUM)	CLOSED CIRCUIT TV STUDIO (MINIMUM)	CLOSED CIRCUIT TV STUDIO (MODERATE)
STUDIO AND/OR VIDEOTAPE ROOM	$30,000—$45,000—$60,000	30 YRS.	$ 1,000	$ 1,500	$ 2,000
VIDEOTAPE RECORDER	20,000— 20,000— 20,000	10 YRS.	2,000	2,000	2,000
CAMERA SYSTEM	25,000— 25,000— 25,000	10 YRS.	2,500	2,500	2,500
FILM AND SLIDE SYSTEM	0— 12,000— 12,000	10 YRS.	....	1,200	1,200
REAR VIEW SCREEN AND PROJECTOR	0— 0— 3,000	10 YRS.	....	....	300
PHOTOGRAPHIC EQUIPMENT	0— 1,000— 10,000	10 YRS.	....	100	1,000
MISCELLANEOUS EQUIPMENT	5,000— 10,000— 20,000	10 YRS.	500	1,000	2,000
ENGINEER (12 MONTHS)			8,000	8,000	8,000
STUDENT CAMERAMEN			2,000	4,000	5,000
DIRECTOR (SEE TABLE 4)			....	....	....
COORDINATOR (⅓ TIME)			4,000	4,000	4,000
MATERIALS, PARTS, ETC.			8,000	6,000	4,000
HEAT, LIGHT, JANITOR, ETC.			2,000	3,000	3,000
TOTAL			$30,000	$33,300	$35,000
COST PER 50-MINUTE PROGRAM, ASSUMING:					
4 PROGRAMS TAPED PER DAY FOR 50 WEEKS (1000)				$33.30	$35.00
6 PROGRAMS TAPED PER DAY FOR 50 WEEKS (1500)				22.20	23.30
8 PROGRAMS TAPED PER DAY FOR 36 WEEKS (1440)			$20.80		

struction which originates as a live lecture to real students. Videotapes are made from a single camera in the rear of the lecture hall and re-run at some later time for blocks of 300 students. Technical equipment consists of one rather expensive camera and accompanying videotape equipment. In computing equipment costs it is assumed that such programs are taped continuously 8 hours a day, 9 months of the year. Videotapes are re-run on separate equipment.

The second category is designated "Studio Minimum" to indicate programs videotaped in a studio without a live audience. Technical equipment consists of two cameras, facilities for showing films and slides and a very modest amount of photographic equipment. In allocating costs it is assumed that programs are videotaped 50 weeks out of the year, 8 hours each day, although with only 4 to 6 programs produced per day. (The larger number probably requires two studios used alternately by a single camera system.)

The third category is designated "Studio Moderate" to indicate a situation where somewhat more elaborate equipment is available and where more time is spent on each program in the studio. In allocating costs it is assumed that only 4 (or possibly 6) programs are videotaped each day for 50 weeks out of the year.

The three categories are thus meant to represent gradations in the technical quality of the TV presentation. The "Studio Minimum" figures are probably not an absolute minimum and the "Studio Moderate" figures are moderate indeed. The range used for equipment cost is extremely narrow. Most of the variation in cost in Table 2 arises as a result of different assumptions as to how the equipment is used. When live lectures are videotaped, it is assumed the equipment is used only 9 months out of the year, but that 8 programs are videotaped per day. When programs originate in a TV studio, it is assumed, because of time required for rehearsal, etc., that only from 4 to 6 programs are produced per day but that this can be done for 50 weeks out of the year —a rather generous assumption. As can be seen from the table, recording costs per 50-minute program vary from $21 to $35.

Instructional costs (Table 3) obviously depend on the salary of the instructor and the proportion of the instructor's salary allocated to television. In order to avoid the difficulties inherent in attempting to determine a reasonable division of the instructor's basic salary between "instruction," "research" and "service" and subsequently trying to allocate the first of these categories between television instruction and conventional instruction, the problem is sidestepped by simply starting out with three levels of instructional cost for television. The reader is

TABLE 3

INSTRUCTIONAL COST PER 50-MINUTE LECTURE*

TELEVISION SALARY	NUMBER OF LECTURES PER YEAR			
	90 (3 PER WEEK)	45 (1½ PER WEEK)	30 (1 PER WEEK)	15 (1 EVERY TWO WEEKS)
$10,000	*$111*	$222	$333	$667
7,500	83	167	250	500
5,000	55	111	167	*333*
2,500	28	56	83	*167*

*The figures used in later estimates are shown in italics.

then free to interpret the figures as he thinks most reasonable. For example, $5,000 may be viewed as one-third of a base salary of $15,000. In general, it is not uncommon to regard three hours of television instruction as the equivalent of six hours of conventional instruction. This seems reasonable where videotapes are produced under studio conditions and where time is required for rehearsal, review, etc. In the case where television simply records a conventional lecture, there seems no reason for allowing appreciably more time for the television instruction than would normally be allowed for live lectures unless, of course, additional preparation is undertaken. In the final comparisons made in this paper, the latter possibility is assumed to be the case.

Moreover, it is difficult to treat the amount allocated for instructional cost entirely separate from the number of videotapes made each year. Table 3 shows a wide variation in instructional cost *per lecture* depending on the number of programs produced per year. The following salaries were selected from this table as being more or less compatible with the effort going into the programs under the circumstances specified. These have been used in the final estimates to be presented in Figure 1[1].

	TOTAL INSTRUCTIONAL COST	COST PER LECTURE
CONVENTIONAL LECTURE (90 LECTURES)	$ 7,500	$ 83
TELEVISION LECTURE (90 LECTURES)	10,000	111
STUDIO "LOW" (15 LECTURES)	2,500	167
STUDIO "MODERATE" (15 LECTURES)	5,000	333

[1]A separate set of estimates was prepared in which the instructional cost was assumed to be one-half that listed above for each of the four categories examined. These results will be mentioned later, although they are not presented in detail.

Table 4 details three levels of supporting assistance, any one of which

TABLE 4

SUPPORTING COSTS PER LECTURE

	LOW 90 LECTURES (3 PER WEEK)	MEDIUM 15 LECTURES (1 EVERY TWO WEEKS)	HIGH 15 LECTURES (1 EVERY TWO WEEKS)
STENOGRAPHER (PART TIME)	—	—	$1,000
STUDENT ASSISTANT (PART TIME)	—	—	1,000
DRAFTSMAN	$ 500	$1,000	2,000
STUDENT DIRECTOR (PART TIME)	2,000	1,000	1,500
MATERIALS	200	250	500
TOTAL	$2,700	$2,250	$6,000
COST PER 50-MINUTE PROGRAM	$30	$150	$400

might be used in conjunction with any combination of the preceding estimates. The range suggested is a wide one varying from $30 to $400 per program. Obviously, television lectures could be given without assistance of any kind and the cost reduced somewhat below our minimum figure. On the other hand, the "high" figures are very modest indeed when compared with commercial productions.

Table 5 shows "playback costs" assuming all videotape for classroom use is played back on separate equipment. The equipment is assumed

TABLE 5

PLAYBACK COST FOR VIDEOTAPE RECORDER—CLOSED CIRCUIT
(Original Cost and Yearly Charge)

	ORIGINAL COST	DEPR.	YEARLY CHARGE AND OTHER EXPENSES
VIDEOTAPE RECORDER	$20,000	10 YRS.	$ 2,000
COAXIAL CABLE	10,000	10 YRS.	1,000
MAINTENANCE OF COAXIAL CABLE			1,000
ENGINEER			8,000
BUILDING SPACE	30,000	30 YRS.	1,000
REPLACEMENT PARTS, ETC.			3,000
MISCELLANEOUS			500
TOTAL			$16,500
COST PER 50-MINUTE PROGRAM, ASSUMING: 35 HOURS USE PER WEEK FOR 36 WEEKS PER YEAR (1260)			$13

to be utilized eight hours a day, 9 months of the year and to require the services of an engineer to operate and maintain. Videotape costs are shown in Table 6. In the final estimates, it is assumed that for lectures

TABLE 6

TV TAPE COST PER 50-MINUTE PROGRAM

60-MINUTE VIDEOTAPE (LIFETIME, 200 PLAYS OR 10 YEARS, WHICHEVER COMES FIRST)	$200
50-MINUTE VIDEOTAPE	$166
MINIMUM CHARGE FOR USING TAPE (RECORDING OR PLAYBACK)	$1 PER RUN
YEARLY COST FOR 90 LECTURES, ASSUMING:	
ONE-HALF OF THE PROGRAMS ARE REMADE EACH YEAR (45 TAPES ALLOCATED TO COURSE)	$750
ONE-THIRD OF THE PROGRAMS ARE REMADE EACH YEAR (60 TAPES ALLOCATED TO COURSE)	$1,000
ONE-SIXTH OF THE PROGRAMS ARE REMADE EACH YEAR (75 TAPES ALLOCATED TO COURSE)	$1,250

produced under studio conditions a large proportion of the tapes are permanently retained and that the tapes are new. Since only a limited number of runs are possible over the lifetime of the tape under these conditions, the tape cost is rather high. The use of tapes with only a minimum number of re-runs remaining on the tape would reduce the tape cost substantially (to roughly $1 multiplied by the number of times the videotape is re-run during the course of the year). Classroom costs are shown in Table 7 and are self-explanatory.

TABLE 7

CLASSROOM COSTS PER STUDENT CREDIT HOUR

(per 50-minute program per year)

TELEVISION SETS (2 SETS AT $200 EACH)	3 YRS.	$133
IMPROVED SPEAKER SYSTEM ($100)	5 YRS.	20
INSTALLATION ($100)	10 YRS.	10
MAINTENANCE ($40)	PER YR.	40
TOTAL		$203
COST PER STUDENT PER YEAR PER 3 CREDIT HOURS, ASSUMING CLASSROOM IS USED 35 HOURS PER WEEK FOR TELEVISION (OR COMPARABLE RATIO OF SETS TO STUDENTS)		$.50

From the almost innumerable ways of combining the figures in these six tables, three separate cost estimates have been prepared. The conditions selected are summarized in Table 8. A sample of the computations involved in making one such cost estimate is shown on page 85.

TABLE 8

SUMMARY OF ASSUMPTIONS UNDERLYING TELEVISION COST ESTIMATES

	TELEVISION LECTURE	STUDIO "LOW"	STUDIO "MODERATE"
RECORDING COURSE (TABLE 2)			
TYPE OF RECORDING SITUATION	LECTURE HALL	STUDIO	STUDIO
RATE OF EQUIPMENT UTILIZATION (PROGRAMS TAPED PER DAY)	8 (FOR 36 WKS.)	6 (FOR 50 WKS.)	4 (FOR 50 WKS.)
COST PER LECTURE	$21	$22	$35
INSTRUCTIONAL COST (TABLE 3)			
LECTURER'S SALARY (TELEVISION ONLY)	$10,000	$2,500	$5,000
PROPORTION OF PROGRAMS RE-MADE PER YEAR	ALL NEW	ONE-SIXTH	ONE-SIXTH
COST PER LECTURE	$111	$167	$333
SUPPORTING COSTS (TABLE 4)	$30 PER LECT.	$150 PER LECT.	$400 PER LECT.
PLAYBACK COSTS (TABLE 5)			
AMOUNT PER PROGRAM	$13	$13	$13
TAPE COSTS (TABLE 6)			
NUMBER OF TAPES PERMANENTLY ALLOCATED TO COURSE	NONE	60	75
COST PER LECTURE	$1 FOR EACH RUN	$11 PER YR.	$14 PER YR.
CLASSROOM COSTS (TABLE 7)	FIFTY CENTS PER STUDENT PER YEAR FOR THREE CREDIT HOURS		

STUDIO "LOW," 15 NEW LECTURES, 300 STUDENTS

RECORDING COSTS	$22 ×	15 LECTURES	= $330
INSTRUCTIONAL COSTS	$167 ×	15 LECTURES	= $2,500
SUPPORTING COSTS	$150 ×	15 LECTURES	= $2,250
PLAYBACK COSTS	$13 ×	90 LECTURES	= $1,170
TAPE COSTS (75 TAPES)	$12,500 ÷	10 YEARS	= $1,250
CLASSROOM COSTS	$.50 ×	300 STUDENTS	= $150
TOTAL COST			$7,650
TOTAL COST DIVIDED BY THE NUMBER OF STUDENTS			= $25

Similar estimates were prepared for a large number of possibilities, three categories of which are shown in Figure 1. It will be noted that television cost figures are shown with comparable cost figures for three types of conventional instruction. The conventional instruction involves (1) large lectures and (2) small classes taught by (a) faculty members teaching 35 students per class with a 9-hour teaching load and by (b) teaching assistants teaching classes of 25 students with a 12-hour teaching load and a salary of $4,000 on a full-time equivalent basis. The cost figures for both conventional lectures and television instruction are based on the assumption that it is necessary to repeat lectures or TV presentations whenever the number of students exceeds 300 or some multiple of 300. (The 301st student implies a second lecture section, etc.) Although this may be somewhat unrealistic, it is obvious that the break must come at some point. It might also be noted that instruction for small classes involves minor discontinuities of the same sort although the estimates are represented in Figure 1 by straight horizontal lines.

The cost figures for instruction by conventional lecture also involve arbitrary judgments not only with respect to the maximum number of students that can be handled in a single lecture section, but also as to the "cost" of duplicating these lectures. Giving a lecture to a large group of lower division students undoubtedly involves more work than teaching a small class in the same subject. How much more? How should a repetition of these lectures be counted? The following figures are probably not unreasonable and reflect the judgment that while a lecturer can probably repeat each lecture once, a second repetition in most large institutions would be handled by a second lecturer. It is assumed in the computations underlying Figure 1 that a lecture can be repeated the first time at half its original cost but that a third presentation involves the same cost as the first series of lectures as shown on the next page:

	ADDITIONAL COST	NUMBER OF STUDENTS	TOTAL COST
FIRST SET OF 90 LECTURES	$7,500	300	$ 7,500
REPETITION OF THESE LECTURES	3,750	600	11,250
NEXT SET OF 90 LECTURES	7,500	900	18,750
REPETITION OF THESE LECTURES	3,750	1,200	22,500

The cost per lecture, therefore, will not decline below the low point shown in Figure 1.

Several important facts become fairly obvious from Figure 1. First, the cost of televised instruction per student decreases almost continuously with the number of students (except for the relatively minor discontinuities involved in re-running tapes for additional blocks of students). This should be contrasted with the cost of instruction for small classes which remains relatively constant as the number of students increases. This is true also for conventional lectures with the qualifications noted above. Second, substantial savings are possible when instructional television is used in place of conventional small classroom instruction whenever the number of students exceeds two or three hundred. Savings increase rapidly as the number of students increases beyond this number. Third, instructional television compares favorably with conventional large lectures on a cost basis when the number of students becomes so large that the usual conventional lecture needs to be repeated. The favorable comparison is possible, however, only if a relatively large proportion of the television lectures can be re-used in subsequent periods. The importance of this factor is illustrated in the following tabulation where costs have been estimated on the same basis as in Figure 1.

YEARLY COST PER STUDENT FOR THREE CREDIT HOURS OF INSTRUCTION

	300 STUDENTS		600 STUDENTS	
	STUDIO LOW	STUDIO MODERATE	STUDIO LOW	STUDIO MODERATE
ALL NEW PROGRAMS	$55	..	$30	..
ONE-HALF NEW	50	$122	27	$63
ONE-THIRD NEW	42	85	23	45
ONE-SIXTH NEW	26	47	15	26

The drastic reduction in the cost of videotaped instruction as a larger proportion of programs are re-used is clearly evident from this tabula-

tion. When as many as 600 students are involved in a given course, differences in cost as between different methods of instruction become fairly small. The decision as to whether to use conventional lectures, televised lectures, or instructional programs televised in a studio, therefore, should probably be made in light of other considerations rather than on the basis of the "cost" of instruction.

Although not illustrated, the effect of assuming that the instructors are paid less (leaving everything else as before) is to shift the breakeven point for television in the direction of larger numbers of students. (Television overhead becomes relatively more important.) For example, assuming half the base pay used in the computations underlying Figure 1 results in shifting the breakeven point as between conventional lecture and television (studio "low," 1/6 re-made) to roughly 900 students.

In conclusion, it is important to remember that at best the estimates which have been made are subject to rather wide variation. The reader can easily combine the figures given in Tables 2-7 in different ways and arrive at considerably different estimates of the "cost" of television. Those persons connected with instructional television might find it profitable to substitute their *actual* equipment costs for the hypothetical figures which have been used here. While these results will undoubtedly differ considerably from one place to another, it is doubted whether the general order of magnitude will differ so much as to invalidate the comparisons. It is also obvious from the discussion that economies from instructional television can be large or small depending upon what is meant by instructional television and whether it is used to replace small classes or large lecture sections. Unless it is wisely used, instructional television can be more expensive than conventional instruction. Except in the context of a specific situation there is certainly no simple answer as to the economies possible through the use of television as an adjunct to conventional instruction.

A number of other qualifications should be kept in mind. There is some reason to believe that the computations for instructional television which have been presented here may be on the low side. First, almost full-capacity operation of television facilities has been assumed and this may or may not be duplicated in actual practice. Second, depreciation and obsolescence of television equipment may be understated. Third, general overhead has not been included for instruction of any type and such expenses may possibly be greater for television than for conventional instruction. Fourth, the cost of paper-grading, student conferences, etc., has not been included either for conventional lectures or for television, although for other conventional instruction it is not

unreasonable to assume that it is inherent in the figures. Fifth, in making those estimates where videotapes are re-used for several years, it has been assumed that a full complement of 90 lectures are developed over whatever time period is necessary, even though only 15 are made each year, and that the annual cost is only that of making, say, 15 lectures per year. While in the long run this is not unreasonable, such a procedure will lead to an underestimate of costs if programs are initially videotaped more frequently than this. In view of the basic crudeness of the estimates, further elaboration was not thought justified. As against all of this, of course, is to be set the situations in which television saves money through the more efficient use of classroom or dormitory space, saving in laboratory equipment, etc. Even more difficult to evaluate, of course, are the instances in which television is performing entirely new tasks and for which comparative cost figures cannot be obtained. In this case, television must be judged on its own merits.

Finally, it is worth noting that there are other circumstances than those examined here for which cost estimates might have been prepared. The most important, perhaps, might be designated "Television Classroom," where the television camera monitors an ordinary small class without the lecture being videotaped but where the lecture is simply reproduced, simultaneously, in other classrooms. Where scheduling permits such a once-and-for-all presentation and where it is thought desirable to maintain a "small class" atmosphere, such a system allows a substantial reduction in cost over videotaped reproduction. It might also be possible to produce "Television Lectures" as here described more economically[2] by using lectures from former years for a substantial portion of the course. Another possibility lies in the duplication of as many "studio" conditions as possible, but with a live student audience. Although this poses a number of problems (studio design, camera placement, special projection equipment, etc.), this is perhaps one of the more promising avenues of future exploration. In any case the possibilities for experimentation have not been exhausted.

[2]If absolutely all the frills are eliminated from the "television lecture" type of instruction (halving the cost of space required for television equipment, eliminating the director and other supporting operating assistance, working 50 weeks out of the year, replacing the engineer operating the videotape recorder for playbacks with student help, etc.) a considerably lower figure is obtained. The yearly cost per student for a three-hour course when 300 students are involved is roughly $32 as compared with the $48 shown in Figure 1. This, however, is still roughly $8 higher than the cost of conventional lectures. When 600 students are serviced, the cost declines to roughly $18. The writer feels these are unrealistically low estimates.

Photographs

page 14, Kalamazoo Gazette, Kalamazoo

page 16, University of Miami, Miami

page 19, Charles Smith, Austin, Texas

page 23, University of Florida, Gainesville

page 29 { *St. Petersburg Times, St. Petersburg*
Kalamazoo Gazette, Kalamazoo
University of Illinois, Urbana